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CORRIGENDA

P. 141, line 13. For " **Ctenichneumon rubroator** " read " **Ctenichneumon rubroater.**"

P. 149, last line. For " *Pseudamblyteles* " read " *Pseudoamblyteles.*"

P. 160, line 10. For " 8. VIII. 1936 " read " 10. X. 1935."

P. 171, column 1, last line. For " *corruscator* " read " *coruscator.*"

P. 173, column 2, line 35. For " *Cyclolabus* Heinrich 1935 " read " Cyclolabus Heinrich 1936."

P. 181. For " **Barreropsyilini** " read " **Barreropsyllini.**"

P. 445 (title-page). For " Pp. 445–488 " read " Pp. 445–486."

P. 487 (title-page). For " Pp. 489–502 " read " Pp. 487–502."

P. 503 (title-page). For " Pp. 503–521 " read " Pp. 503–522."

24 JUN 1953

THE SUB-GENUS *STEGOMYIA* (DIPTERA: CULICIDAE) IN THE ETHIOPIAN REGION

(PART II)

P. F. MATTINGLY

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THE SUB-GENUS *STEGOMYIA* (DIPTERA: CULICIDAE) IN THE ETHIOPIAN REGION

II. DISTRIBUTION OF SPECIES CONFINED TO THE EAST AND SOUTH AFRICAN SUB-REGION

BY

P. F. MATTINGLY

Pp. 1–65; 15 *Text-figures*

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NATURAL HISTORY

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II. DISTRIBUTION OF SPECIES CONFINED TO THE EAST AND SOUTH AFRICAN SUB-REGION

By P. F. MATTINGLY

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SYNOPSIS

The distribution of *Stegomyia* spp. occurring in the West African Sub-region has been discussed in the first paper of this series. The present paper deals with the remaining Ethiopian species, i.e., with those which are restricted to the East and South African Sub-region. As before, zoogeography is discussed mainly in relation to rainfall and altitude, and such notes on bionomics are included as are thought necessary for an understanding of distribution. One new species closely related to *Aëdes aegypti* is described from Mauritius, and the male of *Aëdes woodi*, larvae which may prove to be those of *pseudonigeria* and *masseyi* and a new subspecies of *dendrophilus* from Kenya are described for the first time. Previously unpublished taxonomic data concerning most species are included. An appendix is devoted to the distribution of pale forms of *Aëdes aegypti* in the Ethiopian Region, and other appendices deal with recent information concerning the species treated in the first paper and with the rainfall of the Bor-Pibor-Torit area. The distribution of certain Palearctic *Stegomyia* is discussed in relation to the problem of the origins of the Ethiopian fauna and an account is given of a specimen of *Aëdes cretinus*.

INTRODUCTION

THE present paper follows the pattern of its predecessor (Mattingly, 1952), but is concerned with those species which have not as yet been recorded from anywhere in the West African Sub-region. The number of species discussed is greater than in the first paper but much less is known about them, and this is true of every department of mosquito studies. In the field of distribution certain territories, notably Tanganyika and Nyasaland, which are of vital importance, are almost unknown. With respect to taxonomy four species, *poweri*, *masseyi*, *chaussieri* and *pseudonigeria*, are, at the time of writing, known with certainty only from the adult female, although there is good reason to hope that males and early stages of all of them may very soon be described. The early stages of *woodi* are still unknown, but again there is good hope that these will soon be available. Among these species the first four are all likely to prove of special value for our understanding of the origins and affinities of the sub-genus. In the field of bionomics no studies comparable with those carried out by the yellow fever institutes in Uganda and, to a less extent, Nigeria are as yet available. The present paper, like its predecessor, attempts to bring together all available information relating to *Stegomyia* distribution as a preliminary to the taxonomic study which will form the subject of further papers in the series. It is clear that a review of the sub-genus as a whole will be necessary and this will be undertaken in the third paper of the series. In the present paper all that is attempted is a partial revision of group A, the principal Ethiopian group, and some attention is paid to the distribution of certain Palearctic species, since it is apparent that even this group cannot be fully understood against a purely Ethiopian background.

To save repetition the list of localities with topographical details and the list of references have been restricted to information which has not already been published in Part I. Keys are also omitted since these have already been published. The map of the distribution of collectors (Mattingly, 1952, fig. 1) is not thought to have been sufficiently affected by new records to be worth reprinting. It can be brought up to date almost completely by adding those localities listed on p. 56 of the present paper together with the Kologha Forest, Njombe and the Tzitzikama Mountains.

NOTES ON TAXONOMY

The necessity for a revision of the main groups of the sub-genus as defined by Edwards (1932) has already been noted (Mattingly, 1952), and it is now possible to make certain concrete suggestions for a partial revision of the main Ethiopian group, group A. For reasons given below it is felt strongly that this should be extended by the inclusion of *Aëdes mascarensis* from Edwards' group B, together with the closely related species from Mauritius which is here described for the first time (p. 16). At the same time it is felt that if the present groups are to be maintained then *Aëdes chemulpoensis* Yamada should be transferred from group B to group A. This species is at present known only from North-eastern China, the Mukden area and Korea, but it is a perfectly typical member of group A with respect both to its scutal markings and its male genitalia. Yamada in his type description (Yamada, 1931) noted the resemblance of the scutal markings to those of *simpsoni* and *poweri*, and Feng (1938*b*) again noted its affinities with group A in the first published description of the male terminalia. Edwards seems to have been unacquainted with the male terminalia when he drew up his classification, since the only male specimen in the British Museum of earlier date than Feng's description is undissected. In its femoral and tibial markings *chemulpoensis* resembles *vittatus* and it is thus annectant to group D. The structure of the ventral brush of the larva is somewhat peculiar, but in other respects this stage also is characteristic of group A.

The occurrence in Eastern Asia of a member of group A, which, if we except the cosmotropical *Aëdes aegypti*, is otherwise entirely Ethiopian, may at first sight seem rather startling, but taken in conjunction with such other facts as the occurrence of *vittatus* in Spain, North Africa, the Balearic Islands, Corsica and Sardinia and of an isolated species of Group C (*cretinus*) in Crete, Macedonia and Transcaucasia (Georgia), it is in reasonable conformity with prevailing ideas concerning the pre-glacial distribution of Palearctic woodland faunas. Basing his ideas on the present distribution of loess, Reinig (1936) has pictured the occurrence during the Glacial Period of a broad belt of desiccation with, at its ends, a Mediterranean and an East Asian wooded refuge. This author figures certain smaller refuges in between (*loc. cit.*, fig. 12), but it would seem that among these the Armenio-Persian was glaciated at least in part during the maximum extension of the ice sheets (compare, for example, Furon, 1943, fig. 20). De Beaufort (1951) summarizes Reinig's theories but does not mention these smaller refuges. The present distribution of isolated populations of groups A, C and D in the Palearctic is in close conformity with Reinig's views. *Aëdes vittatus* exactly occupies the western portion of his Mediterranean refuge, and *chemulpoensis* fits squarely into his East Asian refuge. The Cretan and Macedonian form of *cretinus* fits well into the eastern portion of his Mediterranean refuge, but the form (*lindtropi* Schingarew) from Georgia assigned by Baschkareva (1931) and Stackelberg (1937) to this species occurs much too far east and is perhaps to be associated rather with the Armenio-Persian refuge. It does not seem certain that this form is in fact conspecific with *cretinus*, although it may be that the present distribution shows the effect of post-glacial migration, or that Reinig's Mediterranean refuge ought to be extended to include the southern fringes of the Black Sea. Unfortunately only a single much damaged specimen of *cretinus* from any part of its range is at present available for examination (see below under *Aëdes albopictus*, p. 18). Examples of affinities between the Mediterranean and East Asian refuges quoted by De Beaufort are the Blue Jay, *Cyanopica cyana*, with two subspecies in Spain and Portugal and five in South-East Asia and Japan, none occurring in between, and the Barbary Ape (*Macaca sylvana* = *M. inua*) of Gibraltar with relatives confined to Southern Asia and Japan. It is to be noted that in both these cases, as in the case of *vittatus* and *chemulpoensis*, the East Asian fauna is represented only in the western and not in the eastern part of the Mediterranean refuge. In fact it seems that in these cases the western and eastern portions of the Mediterranean refuge constitute distinct faunal areas. This discontinuity between the western and eastern Mediterranean refuges is further illustrated by the case, quoted by De Beaufort later in his book, of the mountain goat, *Capra pyrenaica,* which occurs in the Pyrenees and the higher ranges of the Iberian peninsula and has relatives in Eastern Europe, Crete and the Caucasus but none in the Alps or Appenines. Finally De Beaufort mentions the work of Caradja (1934), who traces affinities between the Lepidoptera of South-west Europe and those of Eastern Asia and observes that they are more primitive than those occurring in between.

On the basis of these facts it may be said that there is evidence for a much wider pre-glacial extension of groups A and D, and perhaps also C, in the Southern Palearctic. It may be noted that *cretinus* also has a relative (*flavopictus* of Japan and Korea) in the East Asian refuge, but it is preferred to postpone discussion of this point to a later paper dealing with the general problem of affinities within the sub-genus. All that is intended here is to attempt to justify the inclusion of *chemulpoensis* in group A and to show that this is defensible on distributional as well as on morphological grounds. The eastern rather than western Palearctic affinities of group A is a matter of some general zoogeographical interest, since a similar phenomenon has been encountered in some other groups (see, in particular, Uvarov, in press).

Aëdes amaltheus. This very remarkable species possesses mesonotal markings typical of Edwards' group A and male terminalia of the type found in his groups B and C. The difficulty of fitting it into Edwards' system has already been noted (Mattingly, 1952), and it will be necessary to deal with this problem in the paper to be devoted to the discussion of the taxonomy of the whole sub-genus in relation to that of the Ethiopian species. Here it may be noted that the only comparable species (*Aëdes galloisi* Yamada) again occurs in Reinig's Easter Asian refuge, being confined as far as is known to Japan. It does not appear, however, that the mesonotal markings of this species are absolutely typical of group A. No specimens are available for examination, but published figures (e.g., in Stackelberg, 1937) show the supra-alar patches extending forward to fuse with the anterolateral patches and backwards to the scutellum. This type of pattern is characteristic of a number of Palearctic, Ethiopian and northern oriental *Finlaya.* The male terminalia and the larva (Sasa and Kano, 1951) appear to be quite typical of group C. The morphological characters of *amaltheus* have been well described by De Meillon and Lavoipierre (1944), and nothing can usefully be added here except to note that the larva possesses certain interesting and possibly primitive characters recalling *vittatus* on the one hand and *unilineatus* on the other, e.g., the branched antennal seta (see Hopkins, 1952), strongly branched saddle hair, spinose saddle edge and tendency to development of precratal tufts.

Aëdes pseudonigeria. The larva from Magoebaskloof, Transvaal, attributed to this species by Ingram & De Meillon (1929) and subsequently to *demeilloni* by Edwards (1936), seems almost certainly to have been wrongly attributed in both cases. It was described by the present author (in Hopkins, 1952) as *? pseudonigeria* purely to avoid introducing another name into the synonymy. In fact, however, it is virtually identical with the larva of *heischi* and almost certainly belongs to a member of that group. Recently larvae collected by Dr. De Meillon in the Karabib area of South-West Africa have been sent to the British Museum. There is some reason to believe that they may be those of *pseudonigeria*. Other identical larvae have been taken by De Meillon together with adults of *pseudonigeria* at Francistown, Bechuanaland (*per fide* Muspratt). In both cases the larvae are unassociated, and I do not think it possible to rule out the possibility that they are those of *unilineatus*, which they closely resemble. It is true that *unilineatus* has not been found in S.W. Africa, but it may well be that collecting there has been confined to altitudes above its, apparently rather restricted, limits. The rainfall in the Karabib area appears to be rather low even for *pseudonigeria*, but might well not be too low for *unilineatus*, which is an exceedingly drought-resistant species (see Appendix I). For these reasons I am unwilling to attribute the Karabib or Francistown larvae to *pseudonigeria* until liason material is available for comparison. A character distinguishing the Karabib larvae from those of *unilineatus* as at present known is the very small number of pecten spines (4–5 in the available material), and this may prove diagnostic should the identification be confirmed. For a final elucidation of the situation it is still highly desirable that the identity of the Magoebaskloof larva should be established by breeding out. The male of *pseudonigeria* is still unknown. It should be noted that the " white spot " on the middle femur mentioned by Edwards (1941) in his key is not a definite spot of the kind found, e.g., in *unilineatus* or *calceatus*, but an irregular patch or streak which is likely to be rather indefinite in some specimens.

Aëdes chaussieri. The male and early stages of this species are still unknown, but as it has recently been found in gallery forest near Elisabethville (Lips, *in litt.*) there is reason to hope that they may soon be obtained. It is difficult to draw any conclusions as to its relationships until such material is available, and this is unfortunate as the species is likely to prove a very interesting one.

Aëdes masseyi. The male is still unknown, but this species has recently been found in the same forest as *chaussieri*. In view of its interesting resemblance to *amaltheus* on the one hand and to *keniensis* on the other further material will be eagerly awaited. The species is discussed below under *keniensis*.

Aëdes keniensis. Van Someren (1946 *bis*) quotes the presence of pale scaling round the edges of the pre-scutellar bare space as a distinctive character from *masseyi*. An examination of the type series of the latter species shows, however, that, at least in some cases, the absence of pale scales from this region is due to rubbing. One paratype from Ruwe clearly shows a thin border of narrow yellow scales. In the single specimen from Elisabethville in the British Museum even this very tenuous border is reduced and only one or two yellow scales are visible. A better distinguishing character concerns the third hind tarsal segment, but it should be noted that, as indicated by Edwards (1941), this is not always entirely dark in *masseyi*, because it has a few pale scales below at the base in the Elisabethville specimen. The specimens from Nairobi tentatively attributed by Edwards (1941) to *masseyi* are quite clearly *keniensis*. Both they and the type series of *keniensis* have the third hind tarsal pale all round on about the basal $\frac{1}{7}$ to $\frac{1}{6}$. Two specimens recently received from Njombe have this segment pale above on about the basal $\frac{1}{9}$ to $\frac{1}{7}$ but are more narrowly pale below. The key to adults given in the first paper of this series should be amended accordingly. For a further note on these specimens see below under " Doubtful Records " (p. 22). Two unassociated larvae, recently received from Elisabethville through the kindness of Monsieur Lips, are believed, from their resemblance to *keniensis*, to be almost certainly those of *masseyi*. They differ from *keniensis* in having strongly sclerotized pecten spines, typically with a single strongly developed secondary denticle (occasionally with 1–2 minute ones dorsally or ventrally in addition) and a very short unbranched saddle hair. On the key to larvae (Mattingly, 1952) they would run down to *aegypti* and *mascarensis*, from which they can be recognized by the structure of the pecten spines and saddle hair. They came from the township area, and were associated in the one case with larvae of *Aëdes schwetzi* and in the other with those of *aegypti*. A fuller description will be published elsewhere (Mattingly and Lips, in press).

Van Someren (1946 *bis*) has suggested that *keniensis* may ultimately prove to be a subspecies of *masseyi*, and the occurrence of the former at Njombe strongly suggests that it is in fact a highland representative of the latter. At the same time it should be noted that *masseyi* shows some very interesting resemblances to *amaltheus*, from which it differs only in scutal characters. Geographically it is more or less intermediate between the two species. Further light on its affinities may be expected from the discovery of the male and early stages.

Aëdes heischi. As noted above, the larva from Magoebaskloof, Transvaal, attributed by Ingram and De Meillon (1929) to *pseudonigeria* is indistinguishable from that of the present species. In view of the very close resemblance of the larva of *keniensis*, noted by Van Someren (1951), however, it would be most unsafe to make a definite attribution until further larvae have been collected and bred out. It should be noted that, as indicated by Van Someren, *heischi* is not always separable with certainty from *Aëdes demeilloni* in the adult stage, since occasional specimens, among them several in the British Museum, have no pale scales, apart from the knee-spot on the anterior surface of the mid femur.

Aëdes demeilloni. This was treated by Edwards (1941) as a subspecies of *deboeri* but it is clearly a distinct species. Differences between the adults are slight but apparently constant. The larval differences are striking, and there appears to be a constant difference in breeding-places since *demeilloni* has so far only been found in plant axils, especially those of *Dracaena*. As noted in the previous paper, confusion of this species with *dendrophilus* (Van Someren, 1946 ; Smithburn & Haddow, 1946 ; Haddow *et al.*, 1947) arose from the misleading description of the latter given by Edwards (1941), and in particular from this author's failure to mention the spines which occur on the basal lobe of the male coxite in both species. Further confusion has arisen from the fact that fig. 61*c* of Hopkins (1936), although labelled " *deboeri* var. *demeilloni*," was in fact drawn from a larva of *angustus*, while fig. 61*e*, labelled " *unilineatus*," was drawn from a larva of *demeilloni*.

Aëdes subargenteus. The larva of this species has previously been known only from a single specimen from Nyasaland bred from an egg laid by the type female.

Through the kindness of Mr. Muspratt, who has recently sent six larvae from Pondoland to the British Museum, it is now possible to amplify the description given by Hopkins (1936, 1952). Mr. Muspratt states that the very pale colour of the head and siphon noted by Hopkins is constant. Antennal seta single. Head setae A, B and C single, *d* single or split distally into 2–3 branches. Mentum rounded, the teeth rather small, 12–13 teeth on either side of the median tooth. Pleural spines very small and pale in colour. Setae on anterior margin of prothorax normally developed. (They are all missing from the Nyasaland larvae, so that Hopkins' statement that they were small and inconspicuous seems probably to have been due to an error of observation.) Comb with 8–10 teeth resembling those of the Nyasaland larva but none of them bifid. Siphonal index (uncrushed) 2·4–2·7. Pecten with 7–13 teeth proximal to the subventral seta and 1–2 detached teeth distal to it. Subventral seta bifid and simple or single and plumose. In one case both conditions are shown by the same larva. Saddle hair single. Upper caudal seta with 3 branches, lower with 2. Setae of ventral brush each with at least 2 branches. Distal edge of saddle with only light sculpturing, i.e., without obvious spiculation. Gills large, sub-equal, sausage-shaped.

Aëdes kivuensis. This is still known only from the type specimen in the Congo Museum at Tervuren. Through the kindness of the Director and Monsieur Basilewsky it has been possible to examine this specimen and the following details may be added to the description given by Edwards (1941) : Anterior median spot of mesonotum composed of narrow scales. Anterolateral pale patches small and narrow, their posterior ends terminating well in front of and outside the posterolateral lines. The latter strongly marked, deep yellow in colour, as in the case of the median lines, and reaching forward almost to the scutal angles. Supra-alar patches small and entirely white. Median lobe of scutellum with a few black scales posteriorly, lateral lobes entirely white. Scale patch on posterior pronotum very small. Abdomen too shrunken to reveal the tergal bands. Fore-leg with the tibia narrowly but completely ringed at base. First two tarsi uniformly ringed at base, the second white on almost the basal half. Mid-leg with a well-developed white spot beyond half-way on the anterior surface of the femur. Femoral knee-spot small but reaching the tip above. Tibia entirely dark. First and second tarsi uniformly ringed at base, the second white on at least the basal half. Hind leg with femur extensively pale at base, with a small white spot just beyond the tip of the basal pale stripe on the anterior surface and a small knee-spot which reaches the apex above. Tibia entirely dark. First three tarsi narrowly pale at base ; the fourth and fifth entirely pale except for a small black spot at the tip below in each case. In view of our almost complete ignorance of the distribution of this form it is preferred to treat it for the present as a distinct species.

Aëdes woodi. A long series of adult females has now been received from Ganda through the kindness of Mrs. E. C. C. Van Someren. A full description will be published in the appropriate taxonomic paper of the present series. All the specimens are immediately distinguishable from those of any other species, having a double median line of yellow scales on the scutum by the dark-scaled lateral lobes of the scutellum. Only two males have so far been received and neither of these is complete. The palps resemble those of *simpsoni* rather than *strelitziae* in having a number of long setae on the two distal segments. The lateral lobes of the scutellum are dark scaled. The scutal ornamentation has been almost entirely obliterated in both specimens, but one of them appears to have the posterior ends of the submedian lines white or whitish and to have the pre-scutellar bare space rather broadly bordered by white scales in addition to some yellow ones. There is some variation in both respects in the females and comparable variation occurs in *Aëdes simpsoni*. Segment II of the abdomen has a few pale scales at the base of the tergite in one specimen. In the other the tergite is rubbed. The pale basal bands on tergites III–VI are shallow as in the female. Those on V and VI are markedly narrower in the males. Sexual dimorphism with respect to the tergal bands is shown by a number of Ethiopian species of the sub-genus. The male terminalia appear to be virtually identical with those of *simpsoni*. The legs of both sexes are very much as in the type. The femoral knee-spots are very short, and are separated from the tips of the femora by distinct dark areas. The second mid-tarsal and the third hind tarsal are pale above on about the basal $\frac{1}{2}$ and $\frac{3}{5}$ respectively and both are rather narrower below. The fourth and fifth hind tarsi are missing from both males. In the females they are entirely dark and entirely pale respectively, as in the type. Attempts to find the breeding-places have hitherto proved unsuccessful and the early stages are still unknown.

Aëdes strelitziae. This has been fully described by Muspratt (1950).

Aëdes poweri. The type female is still the only specimen that can be assigned with certainty to this species, although further specimens collected by Mr. Muspratt in Cape Province, and discussed below under " Doubtful Records," appear almost certainly to belong to it. The affinities of the species are uncertain although it seems to be most nearly related to *contiguus*, which it resembles very closely. Certain characters quoted by Edwards are in fact artefacts. Thus the interruptions to the pale border round the eyes (Edwards, 1923 *bis*) are due to rubbing as, apparently, is the absence of pale scales from the border of the pre-scutellar bare patch (Edwards, 1941). The appearance of the mid-lobe of the scutellum is rather striking, as it possesses more dark scales than are found in the majority of species. Such scales are, however, possessed by all the Ethiopian *Stegomyia*, and their complete absence from individual specimens is the exception rather than the rule although they are seldom mentioned in descriptions ; *contiguus*, in particular, often shows them well. The most distinctive character shown by *poweri* is the possession of a conspicuous pale basal stripe on the lower surface of the middle tibia. This is between $\frac{1}{6}$ and $\frac{1}{5}$ of the tibial length. The third mid-tarsal is quite extensively pale above at the base, but pale scales in this position are not uncommon as an aberration in a number of species. Since the completion of this paper Mr. Muspratt has sent descriptions of the larva and male terminalia which confirm the relationship to the *langata-contiguus* group suggested below under " Distribution." It seems that the terminalia are indistinguishable from those of *contiguus*, while the larva is distinguishable only on variations in the statistical distribution of the number of branches in head seta *d*. Variations in colour characters of the adults include the constant suppression of pale scaling on the distal half of the second mid-tarsus in the male, occasional presence of pale scales round the pre-scutellar bare space and very occasional presence of a pale spot in the middle of one or both front femora.

Aëdes contiguus. As noted by Van Someren (1946 *bis*), this species closely resembles *langata.* It can, however, be separated on the characters given in the key (Mattingly, 1952). The anterolateral scutal patches are also rather smaller and less wedge-shaped (see pl. ii, fig. 11 of Edwards (1941) which apparently represents *contiguus* and not *poweri* as stated). On the basis of these characters it seems fairly certain that the two rather rubbed females of "*contiguus*" mentioned by Edwards (1941) are in fact *langata.* The presence of the latter species in Southern Rhodesia (Ndanga) has been confirmed by the dissection of male terminalia. The presence of *contiguus* in the Transvaal has also been confirmed by the dissection of male terminalia. Transvaal specimens tend to have the pale band at the base of the third hind tarsal rather broader than do those so far seen from Southern Rhodesia ($\frac{1}{6}$ the length of the segment in the type male and the specimen from Ndanga and from $\frac{1}{6}$ to $\frac{1}{4}$ the tarsal length in those specimens so far received from the Transvaal). This band is therefore not always quite so strikingly narrow as Edwards' description might suggest. A very fine series of Transvaal *contiguus* has recently been received from Dr. De Meillon, and the question of variation will be discussed in more detail in the taxonomic paper of the present series.

Aëdes langata. Resemblances to *contiguus* have been discussed in connection with that species. The length of the pale basal band on the third hind tarsal is again variable (about $\frac{1}{4}$ the length of the segment in the Kenya form, $\frac{1}{7}$ this length in the problematical specimen from Nyasaland and $\frac{1}{6}$ in the Southern Rhodesian specimens. This character cannot therefore be safely used for separation from *contiguus.* An incomplete female from Gwelo in the British Museum resembles *langata* in scutal markings and in the broad abdominal bands and distal expansion of the ventral pale stripe at the base of the hind tibia, but differs from all other available specimens in having a pale posterior stripe on about the basal $\frac{5}{7}$ of the first mid-tarsal, much as in *heischi.* This specimen and another, even less complete, from the same locality cannot be attributed with certainty until further material is available. The larva of *langata* closely resembles those of *apicoargenteus*, *soleatus* and *schwetzi* but, in the material available, it can be separated from the first of these by having the antennal seta at less than 0·7 × the distance from the base to the apex.

Aëdes calceatus. The precise status of the various populations attributed to this species is one of the most troublesome problems connected with the Ethiopian *Stegomyia* at the present time. Much more material is needed from certain parts of the range before the problem can be approached with any confidence. For the moment the following brief notes on variation are all that can be offered. It should be borne in mind that not only this species and *soleatus* but also *heischi* and the form from Gwelo here tentatively attributed to *langata* may exhibit a pale posterior stripe on the first mid-tarsal. From *heischi* and *soleatus* all the known forms of *calceatus* can be separated by having an entirely dark fifth hind tarsal, and *soleatus* also differs strikingly in its abdominal markings. From *calceatus langata* differs in its broader abdominal bands and in the shape of the pale line at the base of the hind tibia. In *calceatus* the Livingstone form differs from the type form in having the femoral knee-spots on the hind legs shorter with the backward prolongation reduced or absent, the pale ring at the base of the third hind tarsal segment only about $\frac{1}{10}$ the length of the segment or less (about $\frac{1}{3}$ the length of the segment in the type form from Tanganyika) and the second abdominal tergite all dark. A single male from the Langata Forest in the British Museum, which has terminalia almost precisely like those of the type form *calceatus* and is here tentatively attributed to that species, also has the backward prolongation of the hind femoral knee-spot reduced and the band at the base of the third hind tarsal only about $\frac{1}{7}$ the length of the segment. In this specimen both the second and third abdominal tergites are dark and the median pale stripe on the scutum is more strongly indicated than in the type form, reaching forward as far as the front end of the anterolateral patches. In the type form this stripe stops short at the posterior end of the anterolateral patches, and is represented further forward by at most a few pale scales. In the Langata form the general reduction of pale scaling is also shown in the rather narrower anterolateral pale patches on the scutum, and in the fact that the second mid-tarsal is dark all round on about the apical third (pale behind to the tip in the type form). The pale scales at the base of the third mid-tarsal mentioned by Edwards (1941) are present in only a few specimens in the type series. They are not shown by the Langata or the Livingstone form. As already noted, pale scales occur in this position as an aberration in a number of species of Ethiopian *Stegomyia*. Mrs. Van Someren has kindly sent the following note on variation in Kenya Lowland specimens from Ganda, Gede and Kwale at present tentatively attributed to *calceatus*: "Fore tarsi with first segment wholly or only partly white behind and second segment sometimes white to $\frac{1}{2}$ behind. Mid-tarsi with the amount of black on the first tarsal joint very variable; second segment nearly all white with a dark spot at tip anteriorly; third segment nearly always dark but may have a small patch of white scales at the base behind. Third hind tarsal segment with the white basal band usually very narrow (Ganda and Gede), but it may extend to $\frac{1}{4}$ (Kwale). Hind femur with the anterior surface white on the basal $\frac{1}{3}$ then a small black patch followed by a large silvery white patch at $\frac{1}{2}$; rest black (Ganda and Gede) or white on just over the basal $\frac{1}{2}$, rest black (Kwale). Third abdominal tergite with a white band or spot (♀)." A full discussion of the significance of this variation must await the taxonomic paper in the present series.

Aëdes soleatus. A description of the larva of this species has recently been supplied by Mrs. E. C. C. Van Someren for inclusion in the new edition of vol. i of *Mosquitoes of the Ethiopian Region* (Hopkins, 1952). This description was used together with the paedotype and other specimens in the preparation of the key to larvae in the first paper of the present series. Recent collections in Kenya have shown the adult to be somewhat variable, and Mrs. Van Someren has kindly sent the following note on variation in specimens from Gede and Taveta: "Mid-tarsi 1–4 usually pale behind and above (Gede) or first with only a white ring at the base but sometimes also white behind to near tip, second white with variable amount of black in front at tip, third nearly always black but may sometimes be white behind basally (Taveta). Third hind tarsal segment with basal white ring to ¼. Tergite 2 usually and 3 sometimes without white dorsal bands." Occasional specimens of the Taveta form with the first mid-tarsal segment largely dark behind would run down, on the key to adults included in the first paper of this series, to the *apicoargenteus* group, to which *soleatus* seems to be quite closely related. From the members of this group it can be distinguished by the size and shape of the anterolateral scutal patches and by the less extensive pale patch on the posterior pronotum. Other characters which may perhaps prove less reliable are the smaller knee-spots, and the fact that the median anterior pale spot on the scutum is composed of narrow scales. In connection with the latter character it should be noted that Marks (1951) has found that it may vary in the *scutellaris* group with the temperature at which the early stages are reared. One specimen from Taveta kindly sent by Dr. Lumsden has the basal pale patch on the sixth abdominal tergite little more than half the depth of the segment. Such a specimen, if it possessed the normal type of first tarsal segment, would run down to *heischi*. If with a first tarsal which was largely dark behind, it would run down to couplet 30, but could not be taken beyond this owing to the combination of pale-ringed fifth hind tarsal segment and pale spot on the anterior surface of the mid-femur. Confusion between atypical specimens of *soleatus* and *heischi* seems to be the biggest danger and there is, in fact, some reason to suppose that it may have occurred in the past. The distal expansion of the basal ventral stripe on the hind tibia is perhaps the best single diagnostic character from *heischi*. In the material at present available the larva of *soleatus* can be separated from that of *apicoargenteus* by having the antennal seta at less than 0·7 × the distance from base to apex.

Aëdes apicoargenteus ssp. *denderensis*. This form is of particular interest because it occupies an intermediate position both morphologically and geographically between the *apicoargenteus* and *calceatus* groups. It differs from all other forms in both groups, except *calceatus*, in having the larval siphon entirely dark. The adult shows no constant difference from those of the type form occurring in Uganda and the central Kavirondo district of Kenya, but differs from West African specimens, other than those from the Cameroons, in having smaller anterolateral scutal patches and in the more frequent occurrence of pale scales on the lateral lobes of the scutellum. The third hind tarsal is more narrowly banded than is usual in other regions, except the Cameroons, and in one specimen the fifth hind tarsal is almost entirely dark, a feature also known elsewhere at present only from the Cameroons. It is clear that the distinctive features of *denderensis* which have so far been noted, other than the pigmentation of the larval siphon, are merely those of a highland form. The hind femur is pale behind on about the basal ⅖ and is more extensively pale than in any other form so far examined. Van Someren (1946), however, has recorded specimens from both Kenya and Uganda in which it is pale on up to a half. Despite the suggestion of Wolfs (1949) to the contrary, the condition of the male terminalia falls within the range of variation exhibited by the type form. The character of the larval siphon is considered to be an important one and, as it appears to be geographically representative, there is felt to be some justification for naming this form as a sub-species.

Aëdes schwetzi. A description of the larva of this species has recently been published in the second edition of vol. i of *Mosquitoes of the Ethiopian Region*, to which it was contributed by Mr. G. G. Robinson. It closely resembles those of other members of the group, but is separable from *calceatus* and *denderensis* by having the distal part of the siphon markedly paler than the remainder. The range of variation in the position of the antennal seta overlaps that encountered in *apicoargenteus* on the one hand and *soleatus* and *langata* on the other, since in some larvae it is at more and in others at less than 0·7 × the distance from base to apex. Only a partial separation is therefore possible. From adults of *apicoargenteus* it is easily separated by the broad and conspicuous border of pale scales round the pre-scutellar space, but as already noted under *apicoargenteus* (Mattingly, 1952) the characters of the male terminalia given by Edwards (1941) are not really distinctive unless it be that the ninth tergite of *schwetzi* is a little more deeply excavated. As far as is known the lateral lobes of the scutellum are always entirely white scaled, and this should make separation from the majority of *apicoargenteus* easy.

Aëdes deboeri. This appears to be a member of the *dendrophilus* group. It shows resemblances to *dendrophilus* on the one hand and to *bambusae* on the other. The relationship to *bambusae* is discussed below under that species. The larva shows no constant difference from that of *dendrophilus* but, whereas no larvae of the latter so far seen have more than one detached pecten tooth beyond the siphonal tuft, *deboeri* larvae often have two or three. In *deboeri* larvae the siphonal tuft is normally bifid, rarely single, whereas Kenya and Uganda *dendrophilus* normally have it single. Nigerian and Gold Coast larvae of *dendrophilus*, however, often have it bifid. Adults of *deboeri* can be separated from those of *dendrophilus* by the narrower anterolateral pale scutal patches and by having the second mid-tarsal segment pale above on less than half, usually much less, as well as by the largely dark fifth hind tarsal.

Aëdes bambusae and " ssp. *kenyae*." Type form *bambusae* can be recognized from *deboeri* by the fact that the anterior horn of the anterolateral pale scutal patches is continued round the anterior edge of the scutum nearly to the median anterior pale spot and by the great reduction of the knee-spots on the hind femora, which are represented at most by one or two pale scales. The yellow colouring of the pale scutal markings is not absolutely distinctive, as Kenya *deboeri* often have these markings pale yellow, and in the single female from Marangu tentatively attributed to this species they are deep yellow. Ssp. *kenyae* is intermediate between the two forms. Its pale scutal markings vary from deep yellow to whitish and it is thought that the colour may be influenced by climatic factors, though insufficient evidence is as yet available to establish this. It has well-developed knee-spots on both mid and hind femora and in this respect resembles *deboeri*. Taking into account this fact, its distribution and the known variation in both forms, it seems more reasonable to regard it as a subspecies of *deboeri* than of *bambusae*. More detailed evidence with regard to distribution is, however, much to be desired. From *deboeri* (and from *bambusae*) ssp. *kenyae* is readily distinguishable in the larval stage by having the pecten spines arranged in discontinuous groups with 1–5 spines in each. Adult differences from *deboeri* are less satisfactory, but all specimens at present available are distinguished by the fact that the second mid-tarsal is pale above almost to the tip, at least along the mid-line.

Aëdes angustus. As already indicated, the larva figured for *demeilloni* by Hopkins (1936, fig. 61*c*) is in fact that of the present species. Dr. Haddow has collected further larvae from the Chuya Forest which almost certainly belong to *angustus*. Unfortunately, however, the only specimen from the original series which is now available for examination is a single incomplete pelt. The Chuya Forest larvae are separable from those of all other Ethiopian mainland Stegomyia, except *unilineatus*, the South-west African larvae attributed to *pseudonigeria* and, in some cases, *amaltheus* by the fact that the setae composing the ventral brush are single. In addition to the differences from *unilineatus* given in the key (Mattingly, 1952), they can be recognized from all larvae of *unilineatus* at present available by the absence of stellate setae from the thorax. This character is, however, so variable among the Ethiopian *Stegomyia* that it has to be employed with very great caution.

Aëdes ruwenzori. The breeding-places of this species are still undiscovered, but Gillett (1951*b*) has obtained eggs by means of a similar technique to that employed for *africanus* (Gillet *et al.*, 1950). Larvae were obtained from these eggs, and Mr. Gillett kindly allowed me the use of his MS. in preparing the following brief account: Head seta A with 5–8 branches. Thorax with stellate setae. Comb and pecten spines much as in *bambusae*. Sub-ventral tuft of siphon with 2–4 branches, usually bifid. Saddle hair with 3–7 branches. Upper caudal seta with 2–5 branches, lower trifid. Setae of ventral brush with 2–4 branches. In the key to larvae (Mattingly, 1952) this species would run down with *bambusae*, *deboeri* and *dendrophilus*. Gillett notes that it can be recognized from *bambusae* by the presence of stellate setae on the thorax. The unreliability of this character has, however, been noted above, and a better character would perhaps be the large number of branches in head seta A. All larvae of *bambusae* so far examined have this seta double, and those of *deboeri* and *dendrophilus* have it double or at most, in rare cases, triple. Partial differential characters are afforded by the numbers of branches in the sub-ventral tuft of the siphon and in the saddle hair and caudal setae. From *angustus* the larva should be easily distinguished by the branched setae of the ventral brush as well as by the comb and pecten spines, which are very similar to those of *bambusae*. The structure of the comb and pecten spines makes separation from *africanus* both easy and certain and this is an advantage, since damaged adults from high altitudes, such as that from Dendezi (Mattingly, 1952), may be difficult to assign.

Aëdes mascarensis. That this species is closely related to *aegypti* is shown by the fact that their male terminalia are virtually identical while their larvae can only be separated with difficulty. Despite this fact Edwards (1932) placed *aegypti* in his group A and *mascarensis* in his group B. In doing so he appears to have been influenced by the fact that the mesonotal pattern of *mascarensis* is at first sight strikingly different from that shown by other members of group A. In the present author's opinion *mascarensis* should be transferred to group A together with *chemulpoensis* (see above). This would render both groups more or less homogeneous with respect to their male terminalia. Nor are the mesonotal markings of *mascarensis* nearly so aberrant with respect to the rest of the group as the description given by Edwards (1941) would suggest. It is true that the scales over much of the scutum (at least on the anterior half) are silvery white, but this condition is approached by pale specimens of "*aegypti* var. *queenslandensis*." What Edwards failed to point out is that even in *mascarensis* the typical anterolateral patches, posterolateral lines and supra-alar patches of group A are clearly indicated by local aggregations of broader scales. It is true that the median anterior spot and the median longitudinal pale lines are indistinguishable, but these are normally composed of narrow scales in *aegypti* and in pale specimens of *queenslandensis* they may be very inconspicuous, while in the so-called "var. *mosquito* Robineau-Desvoidy" the median lines are absent. A single female adult recently sent to the British Museum by Monsieur Vinson from Moka, Mauritius, differs notably from *mascarensis* in scutal ornamentation and in the relative widths of the tarsal bands. This seems quite clearly to be a new species, although the possibility of hybridization between *aegypti* and *mascarensis* ought to be investigated. The description follows.

Aëdes (*Stegomyia*) *vinsoni* sp. n.

Adult ♀: Proboscis wholly dark. Clypeus devoid of scales. Back of head differs from that of *mascarensis* in being devoid of dark scales even in the lateral areas. Posterior pronotum largely covered with broad pale scales. (The precise condition in *mascarensis* cannot be ascertained from available specimens owing to rubbing, but it certainly bears a number of large, broad, loosely attached pale scales and is not entirely bare as stated by Edwards (1941)). Mesonotum with anterolateral and supra-alar patches, and posterolateral lines clearly marked by aggregations of relatively broad scales as in *mascarensis*, but differs from *mascarensis* in having a well-marked median longitudinal stripe of broad scales, tapering posteriorly, the scales on either side of this stripe very pale fawn rather than white. Scales around the pre-scutellar bare space also broadened. The whole of the mesonotum is covered with white or whitish scales. (The normal extent of pale scaling in *mascarensis* is not clear. Edwards (1941) and MacGregor (1924, 1927) are ambiguous in their descriptions and all specimens at present available are rubbed. It is, however, clear from these specimens that, at least in some cases, the posterior part of the mesonotum is quite extensively dark.) Scutellum apparently with all lobes entirely pale scaled. (*mascarensis* has the usual small patch of dark scales on the tip of the mid-lobe, although most of these are rubbed away in the available specimens.) Dorsal surface of abdomen almost entirely pale scaled as in some aberrant forms of *aegypti* (Summers-Connal, 1926, 1927; Drake-Brockman, 1911). (In *mascarensis* the tergites have broad, shallow, pale basal bands as in typical *aegypti*.) Front femur very largely pale behind, pale in front and above on about the basal three-fifths. A small but conspicuous white spot above at tip. Tibia all dark. Tarsi all dark except the first two, which are narrowly banded at base. The presence of a knee-spot on the front leg is unusual in the Ethiopian *Stegomyia*. It is shown by *aegypti* and by some, but not all, topotypic *calceatus* but is absent in the case of *mascarensis*, which is almost equally abnormal in having no knee-spots on any of the legs. Mid-femur largely pale in front and behind but with a dark stripe above reaching nearly to base. Tibia entirely dark. First tarsal pale ringed on about the basal ⅛, second pale on about the basal ¼; remainder dark. (*mascarensis* has no knee-spot and the tarsi are rather more narrowly ringed while the femur as a whole is much darker, pale scaling being restricted to a narrow line on the under surface.) Hind femur pale in front nearly to tip, pale behind on about the basal ⅗, with a dark streak above tapering backwards for about the basal ⅘. Knee-spot well developed. Tibia entirely dark. First two tarsi each pale on about the basal ⅓. Third and fourth tarsi pale on about the basal ½ and ⅔ respectively. Fifth tarsal entirely pale. (As already noted, *mascarensis* lacks the femoral knee-spot. It also has the femur less extensively pale and the tarsi more narrowly banded except the fourth, which is pale on about the basal ⅘.) All claws apparently simple as in Group C. (Front and middles claws toothed in *mascarensis* as in group A.)

Adult ♂ and early stages unknown. Holotype ♀ in British Museum.

Aëdes granti. This species was placed by Edwards (1932) in his group C. The recent description of the male terminalia (Leeson & Theodor, 1948) shows him to have been correct. All the claws of the female are simple as in group C and some members of group B. The scutal markings are unlike those of most members of the group in that there is a complete border of pale scales round the edges. In this respect they recall *paullusi*, *hakanssoni* and *scutoscriptus*. Knight & Rozeboom (1946) and Knight & Hurlbut (1949) have recently revised group C, splitting off the *albolineatus* sub-group and raising it to the status of a full group. They recognize three sub-groups typified by *scutellaris*, *albopictus* and *mediopunctatus* respectively, and they place *granti* in the second of these. In this they are apparently governed by the basal position of the median portion of the pale tergal bands, but on the much more important character of the arrangement of pleural scales (probably unknown to them since there is no description of the condition in *granti* in the literature) this species should clearly go into the *scutellaris* sub-group. It has, however, in common with *hakanssoni* and *scutoscriptus* (but not *paullusi*), an extra stripe of pale scales between the dorsal border of the sternopleura and the lower edge of the posterior pronotum, as in *albopictus*, and is thus distinguished from more typical members of the group. It is possible that these three species should be placed in a separate sub-group. They are all restricted to rather remote islands (in the zoogeographical sense), *hakanssoni* and *scutoscriptus* being known only from Truk and Ponape respectively. Further study of the whole group from this point of view is, however, required, and the matter will be discussed more fully in the next paper.

Aëdes albopictus. As noted above, Knight & Hurlbut (1949) have placed this in a separate sub-group from *scutellaris*. In the same sub-group they provisionally placed *unilineatus*. Examination of the latter shows that it possesses all the characters adduced for the *albopictus* sub-group, but differs from *albopictus* in having rather more extensive pleural scaling, and in particular in the presence of a small additional patch of scales in the posteroventral corner of the posterior pronotum. In this respect it agrees with Biro's specimen of *Aëdes cretinus* from Amari, Crete (Edwards, 1921*b*), which I have been able to examine through the kindness of Dr. Soós of the Budapest Museum. Males of *albopictus* from the Seychelles, Madagascar and Mauritius have been dissected and their terminalia compared with those of other specimens from Southern India, Java, Celebes, the Philippines and Hong Kong. In general they show a rather feeble development of the enlarged spines on the basal lobe of the coxite, but a similar condition is found in other parts of the range and it does not appear to be taxonomically significant. Only one topotypical specimen (a male) is available for comparison. This specimen, like those from Mauritius, shows well-developed white stripes on the undersides of the fore and mid-tibiae and the first mid-tarsus. Similar stripes are shown in various degrees of development by most of the specimens from the Seychelles but a few Seychelles specimens and two from Madagascar (kindly lent by Prof. Peus of the Berlin Museum) appear to be entirely dark. It seems that discrepancies in the literature are due to the fact that this character, besides being sometimes difficult to observe, is variable. Thus Ch'I Ho (1931), Martini (1931) and Bonne-Wepster & Brug (1932) all describe the tibiae as entirely dark, despite the fact that white stripes of varying degrees of distinctness can be observed in specimens in the British Museum from Malaya (Perak), Sarawak, the Philippines, China (Hong Kong) and Japan. In other respects the Ethiopian specimens agree well with the topotypical one from Calcutta, differing mainly in having the tarsal bands, in general, slightly narrower. This difference is shown best by the first mid-tarsal and the second hind tarsal, which have the basal bands about $\frac{1}{8}$ to $\frac{1}{5}$ and $\frac{1}{4}$ to $\frac{3}{8}$ the length of the segment respectively in the Ethiopian specimens as compared to $\frac{1}{4}$ and $\frac{2}{5}$ respectively in the Calcutta specimen. All Ethiopian specimens, like the Calcutta specimen, appear to have the hind tibia entirely dark.

DISTRIBUTION RECORDS

The following list resembles in all respects that given in the first paper of the series. The same abbreviations are employed with one addition, which is as follows: Terv. = Congo Museum, Tervuren. Doubtful records are again marked with an asterisk and these, together with records believed to have been based on misidentifications, are discussed separately below (p. 22).

Aëdes amaltheus

N. RHODESIA. Livingstone (De Meillon & Lavoipierre, 1944), Balovale (Robinson, 1948). S. RHODESIA. Bindura*, Darwin*, Shamva* (as *poweri*, Leeson, 1931), Ndanga* (B.M.). BECHUANALAND. Kasane (De Meillon, 1947*a*).

Aëdes pseudonigeria

ANGOLA. O Wambu (= Nova Lisboa, Theobald, 1910), Bailundo (as *wellmani*, Theobald, 1910). Rare in Benguela area, common in western Bihé and eastern and central Bailundo (Wellman, MS.). BECHUANALAND. Unnamed locality (as *poweri*, Edwards, 1912), Botletle River (Edwards, 1941), Francistown (Muspratt, *in litt.*). S.W. AFRICA. Otjiwarongo (Edwards, 1924*a*), Kanovlei, Karabib area*, Okahandja (Muspratt, *in litt.*), Okokarara (B.M.).

Aëdes chaussieri

BELGIAN CONGO. Sandoa (Edwards, 1923*b*), Elisabethville (Schwetz, 1927*b*), Keyberg (Elisabethville area, B.M.), Kisanga Gallery Forest (Keyberg, Mattingly & Lips, in press), Lubilash Valley (L.S.H.). N. RHODESIA. Unnamed locality (as *africanus*, Edwards, 1912), Lake Young (Edwards, 1923 *bis*), Ndola (B.M.).

Aëdes masseyi

BELGIAN CONGO. Ruwe (as *poweri*, Theobald, 1910), Elisabethville (Edwards, 1941), Kisanga Gallery Forest (Keyberg, near Elisabethville, Mattingly & Lips, in press). N. RHODESIA. Unnamed locality (as *poweri*, Neave, 1912), Lake Young (Edwards, 1923 *bis*).

Aëdes keniensis

KENYA. Nairobi (as sp. near *poweri*, V. G. L. Van Someren & De Boer, 1926, as ? *masseyi*, Edwards, 1941, as *keniensis*, E. C. C. Van Someren, 1946 *bis*), Langata Forest (Garnham, 1949), Fort Hall, Kerugoya, Kiambu (E. C. C. Van Someren, *in litt.*), Eldoret*, Meru* (as *simpsoni*, Symes, 1935). TANGANYIKA Njombe* (B.M.).

Aëdes heischi

KENYA. Taveta (E. C. C. Van Someren, 1951), Gede (B.M.), Mombasa, Shimba Hills (E. C. C. Van Someren, *in litt.*). TANGANYIKA. Dar-es-Salaam* (as *pseudonigeria*, Haworth, 1924), Mombo*, Moshi* (as ? *pseudonigeria*, Edwards in McHardy, 1932). TRANSVAAL. Magoebaskloof* (as *pseudonigeria*, Ingram & De Meillon, 1929).

Aëdes demeilloni

ZULULAND. Eshowe (as *subargenteus*, Bedford, 1928, as *deboeri* var. *demeilloni*, Edwards, 1936). NATAL. Amanzimtoti, Impetyeni, Margate (B.M.), Stanger Beach (Muspratt, *in litt.*), Dukuduku Forest, St. Lucia (Muspratt *in litt.*). CAPE PROVINCE. Hole-in-the-Wall (as *deboeri*, De Meillon & Lavoipierre, 1944, *fide* Muspratt), Port St. Johns (B.M.), Coffee Bay, Embotyi, Keimouth, Mazeppa Bay (Muspratt, *in litt.*).

Aëdes kivuensis

BELGIAN CONGO. Kibati (as *subargenteus* ssp. *kivuensis*, Edwards, 1941).

Aëdes woodi

KENYA. Ganda, Kaloleni (B.M.). NYASALAND. Cholo (Edwards, 1922). MOZAMBIQUE. Vilanculos (Pereira, 1946).

Aëdes subargenteus

KENYA. Taveta (B.M.), Ganda (E. C. C. Van Someren, *in litt.*). NYASALAND. Fort Johnston (Edwards, 1925), Ndala Chikoa (Lamborn, *in litt.*), Unnamed locality (Lamborn, 1939), Maiwale (B.M.). ZULULAND. Train between Empangeni and Gingindhlovu* (Ingram & De Meillon, 1927), Umfolosi (B.M.), Dukuduku Forest, Emseleni, St. Lucia (Muspratt, *in litt.*). NATAL. Melville (Muspratt, *in litt.*). CAPE PROVINCE. Embotyi (B.M.), Port St. Johns (Muspratt, *in litt.*).

Aëdes strelitziae

ZULULAND. Dukuduku Forest, Richards Bay, St. Lucia (Muspratt, *in litt.*). NATAL. Margate (Muspratt, 1950), Amanzimtoti (Muspratt, *in litt.*). CAPE PROVINCE. Embotyi, Keimouth, Port St. Johns (Muspratt, *in litt.*).

Aëdes poweri

NATAL. Unnamed locality (Theobald, 1905). CAPE PROVINCE. Groot Rivier Mouth*, Kologha Forest* (Muspratt, *in litt.*).

Aëdes contiguus

S. RHODESIA. Mashonaland (as *africanus*, Theobald, 1901), Salisbury (Edwards, 1936), Ndanga* (B.M.). TRANSVAAL. Onderstepoort, Roberts Heights (as *poweri*, Bedford, 1928), Letaba*, Leysdorp Road*, Rolle Siding*, Tzaneen* (Ingram & De Meillon, 1929), Johannesburg (Edwards, 1936), Fontainbleau, Pretoria, Rietfontein, Witkoppen (B.M.), Pietersburg (Liv.).

Aëdes langata

KENYA. Langata Forest (E. C. C. Van Someren, 1946*a*), Nairobi (E. C. C. Van Someren, *in litt.*). NYASALAND. Maiwale* (H.D.). S. RHODESIA. Salisbury* (as *contiguus*, Edwards, 1941), Gwelo*, Ndanga (B.M.).

Aëdes calceatus

KENYA. Langata Forest* (as *langata*, E. C. C. Van Someren, 1946*a*), Ganda (B.M.), Gede, Kwale (E. C. C. Van Someren, *in litt.*). TANGANYIKA. Lindi (Edwards, 1924*b*). N. RHODESIA. Livingstone (De Meillon & Lavoipierre, 1944). S. RHODESIA. Shamva (Leeson, 1931), Bindura (Edwards, 1941), Darwin (L.S.H.), Chindamora Reserve*, Ndanga* (Meeser, *in litt.*). ZULULAND. Ishongwe (Muspratt *in litt.*).

Aëdes soleatus

KENYA. Gede (Bailey, 1947, E. C. C. Van Someren, 1947), Taveta (Heisch, 1948). TANGANYIKA. Dar-es-Salaam, Lindi (Edwards, 1924*b*, Harris, 1942), points between Tanga and Moshi (Harris, 1942). NYASALAND. Mlanje (B.M.). S. RHODESIA.

Shamva (Leeson, 1931), Bindura, Darwin (Edwards, 1941), Chindamora Reserve*, Ndanga* (Meeser, *in litt.*). ZULULAND. Dukuduku Forest (Muspratt *in litt.*).

Aëdes apicoargenteus ssp. *denderensis*

BELGIAN CONGO. Costermansville (Wolfs, 1949). RUANDA-URUNDI. Kisenyi* as *apicoargenteus*, Seydel, 1929*a*).

Aëdes schwetzi

BELGIAN CONGO. Elisabethville (Edwards, 1926; Schwetz, 1927*a*). Ile Shashu (Edwards, 1941), Kipushi (L.S.H.), Costermansville* (Wolfs, *in litt.*), Panda (Terv.), Lubumbashi River (B.M.). N. RHODESIA. Balovale (Robinson, 1948), Ndola (Robinson, 1950), Lake Bangweulu district, Kasama (B.M.).

Aëdes deboeri

KENYA. Nairobi (as *poweri*, V. G. L. Van Someren & De Boer, 1926, as *deboeri*, Edwards, 1926, E. C. C. Van Someren, 1946*b*), Langata Forest (Garnham, 1949), Kiambu, Ngong (E. C. C. Van Someren, *in litt.*). TANGANYIKA. Arusha*, Mombo*, Moshi* (Harris, 1942), Marangu* (B.M.).

Aëdes bambusae

BELGIAN CONGO. Kausi & Biega Mountains (Wolfs, *in litt.*), Kivu Highlands at 3000 metres (B.M.). UGANDA. Saddle between Mt. Mgahinga and Mt. Sabinio (Edwards, 1935), Kanaba (Edwards & Gibbins, 1939), Behungi, Muko (Edwards, 1941), Lugezi (B.M.), Chuya Forest (Haddow, *in litt.*).

Aëdes bambusae ssp. *kenyae*

KENYA. Elgeyo Escarpment (as *deboeri*, Edwards, 1941), Kaimosi Forest, Kisii, Kitale (E. C. C. Van Someren, 1946*a*), Elburgon, Equator, Mau (E. C. C. Van Someren in Garnham *et al.*, 1946), Cheborget, Eldoret, Muhoroni, Taito (E. C. C. Van Someren *in litt.*), Chagroi Forest (*fide* Muspratt).

Aëdes angustus

BELGIAN CONGO. Kausi and Biega Mountains (Wolfs, *in litt.*). UGANDA. Saddle between Mt. Mgahinga and Mt. Sabinio (Edwards, 1935), Muko (Edwards & Gibbins, 1939), Chuya Forest (Haddow, in *litt.*).

Aëdes ruwenzori

UGANDA. Bunguha, Kabingo, Kakuka, Kizimba (Haddow & E. C. C. Van Someren, 1950).

Aëdes mascarensis

MAURITIUS. Pamplemousses*, Reduit (MacGregor, 1924), Corps de Garde, Unnamed localities (B.M.).

Aëdes vinsoni sp. n.

MAURITIUS. Moka (B.M.).

Aëdes granti

SOKOTRA. Unnamed locality (Theobald, 1901), Mouri (Leeson & Theodor, 1948).

Aëdes albopictus

FR. SOMALILAND. Boat off Djibouti* (as *scutellaris* Walker, Doreau, 1909). AMIRANTE IS. Desroche I. (as *scutellaris*, Theobald, 1912 *bis*). SEYCHELLES IS. Unnamed localities on Coetivy, Dennis and Mahé Islands, Anse aux Pins, Capucin, Cascade Estate, Long Island, Morne Blanc, Porte Victoria, unnamed localities on Praslin and Silhouette Islands (all as *scutellaris*, Theobald, 1912 *bis*), Porte Victoria region and unnamed localities on Mahé Island (Harper, 1947). MAURITIUS. Unnamed localities (as *Culex albopictus*, De Grandpré & De Charmoy, 1900, as *scutellaris*, Theobald, 1905 *bis*, as *Aëdes albopictus*, Edwards, 1920). "Everywhere on the island from sea-level to the highest altitude," Flat Island, Gabriel Island (MacGregor, 1927). MADAGASCAR. Ankasobé, Diego Suarez, Majunga (as *lamberti* Ventrillon, Ventrillon, 1904), unnamed localities (as *scutellaris*, Legendre, 1918, as *albopictus*, Edwards, 1941), Antananarivo (as *lamberti*, Enderlein, 1921). RÉUNION. St. Denis (Edwards, 1920), Ste. Rose (B.M.).

DOUBTFUL RECORDS

Aëdes amaltheus

S. RHODESIA. Ndanga. This record is based on one female only and therefore requires confirmation. The records from Bindura, Darwin and Shamva (as *poweri*, Leeson, 1931) can no longer be confirmed from specimens. The possibility that they refer to *amaltheus* is discussed below under zoogeography.

Aëdes pseudonigeria

S.W. AFRICA. Karabib area. This record is discussed above under Taxonomy.

Aëdes keniensis

KENYA. Eldoret, Meru (as *simpsoni*, Symes, 1935). As noted in the previous paper, records of *simpsoni* from above about 5000 ft. in Kenya are probably the result of misidentification. The true identity of the species concerned can no longer be confirmed from specimens, but Mrs. Van Someren has suggested (*in litt.*) that they may have been *keniensis*, and this seems very probable. TANGANYIKA. Njombe (B.M.). This record is based on two females only and therefore requires confirmation. One specimen is, however, in perfect condition and seems typical. Both have a number of pale scales below at the base of the hind tibia as mentioned by Mrs. Van Someren (1946, *bis*) for some Kenya specimens, and one has two or three white scales forming a very small white spot beyond half-way on the anterior surface of the mid femur.

Aëdes heischi

TANGANYIKA. Dar-es-Salaam (as *pseudonigeria*, Haworth, 1924). There is one female specimen of Haworth's in the British Museum apparently belonging to this species, but its identity requires confirmation. Mombo, Moshi (as ? *pseudonigeria*, Edwards in McHardy, 1932). The identification of these specimens seems to have given Edwards considerable trouble, and it is not clear whether he came to any final decision about them. No specimens have been preserved. On the basis of our present knowledge an attribution to *heischi* seems possible but specimens are badly needed from this area. (See also under *deboeri* below.) TRANSVAAL. Magoebaskloof (as *pseudonigeria*, Ingram & De Meillon, 1929). This record is based on a whole larva and a larval and a pupal pelt in the British Museum. The larvae appear to be indistinguishable from those of *heischi* but adults are required for confirmation, since it is possible that we may be dealing with an undescribed species of the *demeilloni* group.

Aëdes subargenteus

ZULULAND. Train between Empangeni and Gingindhlovu (Ingram & De Meillon, 1927). The British Museum has a specimen which is marked as taken in a caboose at Umfolosi in March, 1927, and presented by Dr. Ingram. It is almost certainly the specimen to which this record refers. Umfolosi does not, however, lie between Empangeni and Gingindhlovu, but is a few miles up the line from Empangeni.

Aëdes poweri

CAPE PROVINCE. Groot Rivier Mouth, Kologha Forest (Muspratt, *in litt.*). Specimens have not as yet been received for comparison with the type, but from Mr. Muspratt's description the assignation to *poweri* seems a reasonable one. It will, however, be necessary to have males and early stages from Natal before the identity of the Cape Province with the topotypic form can be fully established.

Aëdes contiguus

TRANSVAAL. Letaba, Leysdorp Road, Rolle Siding, Tzaneen (as *poweri*, Ingram & De Meillon, 1929). There is no evidence that, in reassigning Ingram and De Meillon's material, Edwards (1941) saw specimens from anywhere but Johannesburg and Pretoria. Records from below 3000 ft. are therefore still open to question, and it is preferred to ignore them in considering the distribution of *contiguus* until they can be confirmed. Dr. De Meillon kindly sent the remaining material (one specimen each from Letaba and Tzaneen), but, as these specimens are reduced to the thorax only, their identity cannot be confirmed. S. RHODESIA. Ndanga (B.M.). This record is based on a unique female and therefore requires confirmation.

Aëdes langata

NYASALAND. Maiwale (H.D.). This record is based on one female only and therefore requires confirmation. S. RHODESIA. Salisbury (as *contiguus*, Edwards, 1941). This record is based on two badly rubbed females and requires confirmation. The record from Gwelo is discussed above under Taxonomy.

Aëdes calceatus

KENYA. Langata Forest (as *langata*, E. C. C. Van Someren, 1946*a*). This record is discussed above under "Taxonomy." S. RHODESIA. Chindamora Reserve, Ndanga (Meeser, *in litt.*). No specimens from either locality are available for examination and these records must therefore be regarded as provisional.

Aëdes soleatus

S. RHODESIA. Chindamora Reserve, Ndanga (Meeser, *in litt.*). No specimens from either locality are available for examination and these records must therefore be regarded as provisional.

Aëdes apicoargenteus ssp. *denderensis*

RUANDA-URUNDI. Kisenyi (as *apicoargenteus*, Seydel, 1929*a*). Monsieur Seydel informs me that no specimens are now available, and there appears to be no means of deciding whether the record should be attributed to the type form or the subspecies.

Aëdes schwetzi

BELGIAN CONGO. Ile Shashu (Edwards, 1941), Costermansville (Wolfs, *in litt.*). These records are discussed under Zoogeography.

Aëdes deboeri

TANGANYIKA. Arusha, Mombo, Moshi (Harris, 1942). These records cannot now be confirmed. They may perhaps have referred to *heischi*. Mr. Swaine kindly sent some of Harris's specimens from the laboratory at Morogoro but they were unfortunately destroyed in transit. The record from Marangu is discussed above under "Taxonomy."

Aëdes mascarensis

MAURITIUS. Pamplemousses (MacGregor, 1924). This record was based on a casual observation of a mosquito in flight and is therefore open to question.

Aëdes albopictus

FR. SOMALILAND. Boat off Djibouti (as *scutellaris*, Doreau, 1909). This record was based on a casual observation and there is no means of confirming it.

Records Based on Misidentifications

Aëdes pseudonigeria

Kenya. Nairobi (V. G. L. Van Someren & De Boer, 1926). This record appears to have been based on a larva which is now in the British Museum. It belongs to a species of *Aëdimorphus*. Tanganyika. Dar-es-Salaam (Haworth, 1924), Mombo, Moshi (Edwards in McHardy, 1932). It is most improbable, on distributional grounds, that these attributions can have been correct. The species concerned is here provisionally taken to be *heischi*, but it might have been *deboeri* or *soleatus*. Specimens from all these localities would be very welcome. Transvaal. Magoebaskloof (Ingram & De Meillon, 1929). See above, in the section on Taxonomy, under *heischi*. Zululand. Eshowe (Ingram & De Meillon, 1927). This record was based on the material subsequently taken by Edwards (1936) as the type series of *demeilloni*. In addition to *demeilloni* it contains one specimen of *dendrophilus* (Mattingly, 1952).

Aëdes demeilloni

Uganda. Mongiro (Smithburn & Haddow, 1946), Mamirimiri (Haddow *et al.*, 1947), Kenya. Kaimosi Forest (E. C. C. Van Someren, 1946). All these records refer to *dendrophilus* (Mattingly, 1952). Zululand. Eshowe (Edwards, 1936). This material contained one specimen of *dendrophilus* (Mattingly, 1952).

Aëdes poweri

Belgian Congo. Kabinda (Schwetz, 1927*b*) = *apicoargenteus*, Ruwe (Theobald, 1910) = *masseyi*. Kenya. Unnamed locality (Neave, 1912) = sp. indet., Nairobi (V. G. L. Van Someren & De Boer, 1926) = *deboeri*. N. Rhodesia. Unnamed locality (Neave, 1912) = *masseyi* from Lake Young. Transvaal. Roberts Heights (Bedford, 1928) = *contiguus*. Bechuanaland. Unnamed locality (Edwards, 1912) = *pseudonigeria* from Botletle River.

Aëdes scutellaris

All records from the Ethiopian Region (Doreau, 1909; Theobald, 1912 *bis*; Legendre, 1918) appear to refer to *albopictus*.

Unidentified and Misquoted Localities.

Angola. O Wambu (*Aëdes pseudonigeria*, Theobald, 1910). Apparently a version of Huambo which as Mr. Exell of this Museum has kindly informed me, is an old name for Nova Lisboa.

Transvaal. Pietersburg, Rietfontein (*Aëdes contiguus*, B.M. & Liv.). There are several places with these names in the Transvaal. In the list of localities (p. 26) I have included what appear to be the largest places with the appropriate names.

Distribution Outside the Ethiopian Region

Aëdes albopictus. South Georgia* (probably *cretinus* or a nearly related species (*lindtropi* Schingarew), see Stackelberg, 1937), Chagos Archipelago and throughout Oriental Region, N.E. China to Manchurian border, Japan to 40° N., Ryuku Islands, Formosa, Mariana Islands, Dutch New Guinea*, Serang*, Timor*, Hawaiian Islands. Temporarily established in Port Darwin, where it apparently did not persist. Records from Polynesia are incorrect. (Theobald, 1912 *bis* ; Rhoudkhadzé, 1926 ; Kumm, 1931*b* ; Barraud, 1931 ; Feng, 1938*a* ; Bohart & Ingram, 1946 ; Farner *et al.*, 1946 ; Brug & Bonne-Wepster, 1947 ; Chow, 1949, 1950).

Records marked with an asterisk are doubtful and require confirmation.

LIST OF LOCALITIES WITH TOPOGRAPHICAL DETAILS

The remarks made in connection with the list of localities published in the first paper of this series (Mattingly, 1952) apply equally to the present one. Altitudes are again given in feet, where possible to the nearest 100 ft., otherwise to the nearest 500ft., and rainfalls as the mean annual total to the nearest 5 inches. Figures enclosed in brackets have been read from maps or, in the case of some rainfalls, refer to an adjacent station. Details of localities included in the previous list are not repeated.

List of Localities

Locality.	Altitude	Latitude	Longitude	Rainfall
Ankasobé, Madagascar	(4,500)	18.20 S.	47.10 E.	(55)
Anse aux Pins, Seychelles	<500	4.41 S.	55.32 E.	(90)
Antananarivo, Madagascar	4,600	18.58 S.	47.30 E.	(60)
Arusha, Tanganyika	4,600	3.25 S.	36.45 E.	45
Bailundo, Angola	(5,500)	(12.15 S.)	(16.50 E.)	(70)
Behungi, Uganda	(8,000)	1.15 S.	29.48 E.	(55)
Benguela, Angola	<500	12.35 S.	13.26 E.	(10)
Botletle River, Bechuanaland	(3,000)	20.12 S.	24.20 E.	15
Bunguha, Uganda	(6,000)	(0.43 N.)	(30.07 E.)	(60)
Capucin Point, Seychelles	<500	(4.48 S.)	(55.33 E.)	(90)
Cascade Estate, Seychelles	1,000	(4.41 S.)	(55.29 E.)	(100)
Chagroi Forest, Kenya	(6,000)	(0.30 S.)	(35.10 E.)	(55)
Cheborget, Kenya	(6,200)	0.35 S.	35.10 E.	(55)
Chindamora Reserve, S. Rhodesia	(4,500)	(17.30 S.)	(31.20 E.)	(35)
Cholo, Nyasaland	3,000	(16.05 S.)	(35.04 E.)	60
Chuya Forest, Uganda	(5–8,000)	(1.15 S.)	(29.45 E.)	(50)
Coetivy I., Seychelles	<500	(7.16 S.)	(56.16 E.)	(90)
Coffee Bay, Cape Prov.	<500	31.58 S.	29.18 E.	(45)
Mt. Corps de Garde, Mauritius	2,400	20.16 S.	57.27 E.	(65)
Darwin, S. Rhodesia	3,100	16.40 S.	31.30 E.	25
Dennis I., Seychelles	<500	(3.48 S.)	(55.42 E.)	(90)
Desroche I., Amirantes	<500	(5.50 S.)	(53.54 E.)	(90)
Diego Suarez, Madagascar	<500	12.10 S.	49.20 E.	(45)
Djibouti, Fr. Somaliland	<500	11.34 N.	43.09 E.	(5)

LIST OF LOCALITIES (*cont.*).

Locality.	Altitude	Latitude	Longitude	Rainfall
Dukuduku Forest, Zululand	<500	28.24 S.	32.18E	40
Elburgon, Kenya	7,900	(0.18 S.)	(35.51 E.)	45
Elgeyo Escarpment, Kenya	8,000	1.00 N.	35.10 E.	45
Emseleni, Zululand	<500	(27.25 S.)	(32.30 E.)	(40)
Equator, Kenya	9,000	00.00	35.34 E.	50
Flat I., Mauritius	<500	(19.52 S.)	(57.39 E.)	(40)
Fontainbleau, Transvaal. *See* Johannesburg.				
Gabriel I., Mauritius	<500	(19.53 S.)	(57.41 E.)	(40)
Ganda, Kenya	<500	(3.13 S.)	(40.03 E.)	(45)
Gingindhlovu, Zululand	<500	(29.01 S.)	(31.38 E.)	45
Groot Rivier Mouth, Cape Prov.	<500	(33.58 S.)	(25.03 E.)	(40)
Hole-in-the-Wall, Cape Prov.	<500	32.07 S.	29.15 E.	(45)
Ile Shashu, Belgian Congo	4,800	(2.02 S.)	(28.55 E.)	(55)
Impetyeni Forest, Natal	(4,500)	(30.40 S.)	(29.35 E.)	(50)
Ishongwe, Zululand	(500)	27.25 S.	32.25 E.	(30)
Johannesburg, Transvaal	5,900	26.11 S.	28.04 E.	35
Kabingo, Uganda	6,500	0.12 N.	29.58 E.	(45)
Kakuka, Uganda	7,000	0.35 N.	30.01 E.	(65)
Kaloleni, Kenya	<500	3.05 S.	39.38 E.	(30)
Kanaba, Uganda	(7,500)	1.23 S.	29.58 E.	(55)
Kanovlei, S.W. Africa	(4,000)	19.15 S.	19.20 E.	(20)
Kasama, N. Rhodesia	4,400	10.10 S.	31.23 E.	50
Kausi and Biega Mts., Belgian Congo	6,500	2.20 S.	28.40 E.	(60)
Keimouth, Cape Province	<500	(32.41 S.)	(28.22 E.)	(40)
Kerugoya, Kenya	(5,000)	0.30 S.	37.16 E.	(50)
Keyberg, Belgian Congo. *See* Elisabethville.				
Kibati, Belgian Congo	6,500	1.34 S.	29.16 E.	(60)
Kipushi, Belgian Congo	(4,000)	(11.47 S.)	(27.15 E.)	45
Kizimba, Uganda	(6,000)	0.39 N.	30.04 E.	(55)
Kologha Forest, Cape Prov.	(4–5,000)	(32.30 S.)	(27.20 E.)	40
Kwale, Kenya	(500)	4.10 S.	39.32 E.	40
Long I., Seychelles	<500	(4.37 S.)	(55.31 E.)	(90)
Lubilash Valley, Belgian Congo	(2,500)	(9.35 S.)	(24.07 E.)	(55)
Lubumbashi R., Belgian Congo	(4,000)	(11.30 S.)	(27.20 E.)	(50)
Lugezi, Uganda	7,500	1.25 S.	29.34 E.	(60)
Magoebaskloof, Transvaal	3,500	(23.52 S.)	(30.02 E.)	(35)
Mahé I., Seychelles	(0–3,000)	4.45 S.	55.36 E.	(85–150)
Maiwale, Nyasaland	3,200	(14.25 S.)	(35.17 E.)	(25)
Majunga, Madagascar	<500	15.40 S.	46.20 E.	(60)
Marangu, Tanganyika	4,600	3.19 S.	37.33 E.	(50)
Mau, Kenya	8,300	0.10 S.	35.40 E.	55
Mazeppa Bay, Cape Prov.	<500	(32.30 S.)	(28.35 E.)	(50)
Melville, Natal	500	30.39 S.	30.31 E.	40
Mt. Mgahinga, Uganda	(4–9,000)	(1.23 S.)	(29.39 E.)	(60)
Mkanduli, Cape Province	(2,000)	31.46 S.	28.43 E.	25
Mlanje, Nyasaland	4,100	(16.07 S.)	(35.47 E.)	70
Moka, Mauritius	1,100	20.13 S.	57.30 E.	(70)
Mombo, Tanganyika	1,400	4.52 S.	38.14 E.	35

List of Localities (*cont.*).

Locality.	Altitude	Latitude	Longitude	Rainfall
Morne Blanc, Seychelles	800	(4.39 S.)	(55.27 E.)	(100)
Mouri, Sokotra	<500	(12.36 N.)	(53.59 E.)	(15)
Muko, Uganda	7,500	(1.13 S.)	(29.50 E.)	(55)
Ndala Chikoa, Nyasaland	(1,600)	(14.10 S.)	(35.05 E.)	(25)
Ngong, Kenya	6,400	1.18 S.	36.40 E.	35
Njombe, Tanganyika	6,000	9.20 S.	34.46 E.	40
Okokarara, S.W. Africa	(4,500)	20.35 S.	17.27 E.	(20)
Otjiwarongo, S.W. Africa	4,800	(20.27 S.)	(16.39 E.)	(15)
Pamplemousses, Mauritius	<500	(20.09 S.)	(57.35 E.)	(50)
Panda, Belgian Congo = Jadotville.				
Porte Victoria, Seychelles	<500	4.30 S.	55.29 E.	85
Praslin I., Seychelles	(0–1,300)	(4.19 S.)	(55.43 E.)	(90–120)
Reduit, Mauritius	(1,000)	(20.12 S.)	(57.33 E.)	(60)
Richards Bay, Zululand	<500	28.38 S.	32.04 E.	45
Rietfontein, Transvaal	5,400	26.09 S.	28.11 E.	(30)
Rolle Siding, Transvaal	1,600	(24.49 S.)	(31.07 E.)	(20)
Ruwe, Belgian Congo	(4,000)	10.41 S.	25.35 E.	45
Mt. Sabinio, Uganda	(4–12,000)	1.25 S.	29.34 E.	(60)
St. Denis, Réunion	<500	20.55 S.	55.30 E.	>100
St. Lucia, Zululand	<500	(28.30 S.)	(32.25 E.)	(35)
Ste. Rose, Réunion	<500	(21.07 S.)	(55.50 E.)	>100
Sandoa, Belgian Congo	2,900	9.39 S.	22.44 E.	(50)
Shimba Hills, Kenya	1,000	4.13 S.	39.26 E.	(45)
Silhouette I., Seychelles	(0–2,500)	(4.28 S.)	(55.14 E.)	(90–140)
Stanger Beach, Natal	<500	(29.20 S.)	(31.20 E.)	(40)
Taito, Kenya	(6,500)	0.25 S.	35.15 E.	(65)
Umfolosi, Zululand	<500	28.25 S.	32.14 E.	45
Vilanculos, Mozambique	<500	22.29 S.	34.51 E.	25
Witkoppen, Transvaal. *See* Johannesburg.				

BIONOMICS IN RELATION TO DISTRIBUTION

General considerations have already been discussed (Mattingly, 1952), and accordingly all that is attempted here is a presentation of the available data.

Breeding-Places.

The same classification into "Preferred" and "Occasional" is adopted as in the previous paper.

Aëdes amaltheus. Known only from tree-holes (De Meillon & Lavoipierre, 1944). *Aëdes pseudonigeria.* De Meillon's larvae from S.W. Africa were found in tree-holes. *Aëdes chaussieri.* Breeding-places unknown. *Aëdes masseyi.* Breeding-places unknown. *Aëdes keniensis.* Known only from tree-holes (E. C. C. Van Someren, 1946 *bis*). *Aëdes heischi.* Known only from tree-holes (E. C. C. Van Someren, 1951 ; Lumsden, *in litt.*). *Aëdes demeilloni. Preferred. Dracaena* axils (Hopkins, 1936 ; Muspratt, *in litt.*). *Occasional.* Bamboos (Ingram & De Meillon, MS. It seems possible, however, that this may have referred to *dendrophilus*), banana and *Strelitzia* axils (Muspratt, *in litt.*). *Aëdes subargenteus.* Known only from tree-holes (Hopkins, 1936). Pondoland larvae, like the paedotype, were obtained from gravid wild-caught females (Muspratt, *in litt.*). *Aëdes kivuensis.* Breeding-places unknown. *Aëdes woodi.* Breeding-places unknown. *Aëdes strelitziae. Preferred.* Axils of *Strelitzia nicholai* (Muspratt, 1950). *Occasional.* Axils of cultivated banana (Muspratt, 1950), *Dracaena* axils (Muspratt, *in litt.*). *Aëdes poweri.* Breeding-places unknown. Cape Province larvae have been obtained from gravid females (Muspratt, *in litt.*). *Aëdes contiguus. Preferred.* Probably tree-holes. *Occasional.* A rot-hole in a paw-paw tree. *Pandanus* axils, a snail shell (Hopkins, 1936). *Aëdes langata.* Known only from tree-holes (E. C. C. Van Someren, 1946 ; Meeser, MS.). *Aëdes calceatus. Preferred.* Tree-holes (Muspratt, 1945). *Occasional.* Crowns of coconut palms (Haworth, 1924. The findings of Lester (1927) and Wiseman *et al.* (1939), however, appear to prove conclusively that the record was due to introduction by a native collector), utensils (Muspratt, 1945), bamboo pot in a tree (E. C. C. Van Someren, MS.). *Aëdes soleatus. Preferred.* probably tree-holes (Harris, 1942 ; Lumsden, *in litt.*). *Occasional.* Crowns of coconut palms (Haworth, 1924, but see above under *calceatus*), bamboo stumps (Harris, 1942), bamboo pots set up as traps (Bailey, 1947). *Aëdes apicoargenteus* ssp. *denderensis.* Known only from a tree-hole (Wolfs, 1949). *Aëdes schwetzi. Preferred.* Tree-holes and bamboo stumps (Robinson, *in litt.*). *Occasional.* A tin, a hole in cement, a tub (Schwetz, 1927*a*). *Aëdes deboeri.* Known only from tree-holes (Harris, 1942 ; E. C. C. Van Someren, 1946 *bis*). *Aëdes bambusae.* Known only from bored bamboos (Hopkins, 1936). *Aëdes bambusae* ssp. *kenyae.* Tree-holes, rock-holes, bamboo pots (Garnham *et al.*, 1946).

Aëdes angustus. Known only from bored bamboos (Hopkins, 1936). The compressed thorax suggests that it is specially adapted to this type of habitat. *Aëdes ruwenzori.* Breeding-places unknown. Despite the compressed thorax all attempts to find larvae in bamboos have failed. (Haddow & Van Someren, 1950). Larvae have been obtained from wild-caught gravid females (Gillett, 1951*b*). *Aëdes mascarensis.* Known only from tree-holes (MacGregor, 1924). *Aëdes vinsoni.* Breeding-places unknown. *Aëdes granti.* Known only from wells (Leeson & Theodor, 1948). *Aëdes albopictus.* Common in tree-holes, cut bamboos, leaf axils and coconut shells, rare in ground pools, rock-holes and utensils (Farner *et al.*, 1946). MacGregor (1927) differs in recording it as common in rock-holes in Mauritius, but it should be noted that the term " rock-hole " may connote two very distinct types of breeding-place (Mattingly, 1952). Chow (1950) infers that it is common in artificial water containers in Formosa, and again it may be noted that the term " utensils " may include a number of quite distinct ecological niches. Bick (1949) records it as commoner in artificial containers than in tree-holes.

SEASONAL DISTRIBUTION

So little is known about the species dealt with in the present paper that almost nothing can be added to the summary already given (Mattingly, 1952). For some brief notes on *Aëdes bambusae kenyae* see Garnham *et al.* (1946). For *Aëdes deboeri* see Garnham, 1949, and for *Aëdes calceatus* and *schwetzi* see Robinson, 1950. *Aëdes albopictus* is of special interest because of its more northerly occurrence in the Far East than in the case of *Aëdes aegypti* or most other species of the sub-genus. The most northerly record of *albopictus* appears to be from Pekin where it was found in early September (Ch'i Ho, 1931). This record seems to be a very exceptional one, and it is doubtful whether it indicates an indigenous population. Feng (1935), however, records it as the commonest day-time-biting mosquito a little further south in Shantung Province. Lamborn (1922) notes its almost complete absence from Shanghai during a cold spell when the mean daily temperature was 61° F. Many authors record it as most abundant during the rainy season, and Senior White (1934) states that it occurs in Calcutta only at this time. The figures given by the latter author are very small, but they seem to indicate that it makes its appearance well after the beginning of the rains. The same author (1920) records it as abundant throughout the year in Ceylon.

BITING-HABITS

As in the previous paper of this series the subject of biting-habits is taken, for convenience, to include that of vertical distribution. The following species seem likely to bite man at least on occasion.

Aëdes amaltheus. A few specimens were taken biting on the forest floor at Kasane (De Meillon, 1947*a*). *Aëdes pseudonigeria.* Wellman, in an unpublished letter to Austen, describes this as a " persistent and vicious biter." One specimen in the British Museum, probably the one referred to by Theobald (1910), is marked as taken out of doors in a village at 5 p.m. and as a common domestic mosquito biting by day. Others are marked as taken at house or tent lamps at 8 p.m. Mr. Muspratt informs me that this species was taken biting by De Meillon in S.W. Africa. *Aëdes chaussieri.* The single specimen from Ndola was taken biting at dusk (Robinson, *in litt.*). It seems probable that some at least of the Congo specimens were also taken biting. *Aëdes masseyi.* It seems probable that adults in the British Museum were taken biting. *Aëdes keniensis.* In a long series of catches in the Langata Forest Garnham (1949) took only one specimen biting. *Aëdes demeilloni.* De Meillon and Lavoipierre (1944) took a single specimen biting in forest at Mkanduli. *Aëdes subargenteus.* In an unpublished report very kindly sent by Dr. Lamborn he records this species as biting very viciously in dense woodland at about 11 a.m., and again in the afternoon near Ndala Chikoa. Lumsden (*in litt.*) records it as biting at Taveta both on the forest floor and in the canopy. *Aëdes kivuensis.* The only known specimen was presumably taken biting, but there is no definite information on this point. *Aëdes woodi.* The Mozambique specimen was taken biting (Pereira, 1946), and Mrs. Van Someren states (*in litt.*) that specimens are easily obtained in the bush at Ganda. There is no information concerning the type specimen. *Aëdes strelitziae.* This is noted by Muspratt (1950) as a more persistent daytime biter than *simpsoni*. *Aëdes poweri.* Muspratt states (*in litt.*) that he took a number of females biting in the Kologha Forest. *Aëdes contiguus.* Bedford (1928) records specimens (as *poweri*) attempting to bite at Onderstepoort. Ingram & De Meillon (1929) give larval records only. *Aëdes soleatus.* Bailey (1947) took adults on a number of occasions in forest. Lumsden (*in litt.*) has records of biting on the ground in bush. *Aëdes deboeri.* Garnham (1949) found this to be the principal man-biting *Aëdes* in the Langata Forest. *Aëdes bambusae.* Edwards (1935) records the capture of a few adults and Haddow states (*in litt.*) that he observed biting in the Chuya Forest. *Aëdes bambusae kenyae.* Garnham *et al.* (1946) took " a few adults only " in the Kaimosi Forest. They also took some adults in houses at Kisii. *Aëdes angustus.* Haddow states (*in litt.*) that he took this as a tree-top biter in the Chuya Forest. Edwards (1935) appears to have taken it only in the larval stage but he is not very clear on this point. *Aëdes ruwenzori.* Haddow and Van Someren (1950) note this as a man-biting species markedly arboreal and crepuscular in its habits. *Aëdes mascarensis.* MacGregor (1927) states that " it readily attacks man but is not very persistent in its attack, and it is easily frightened off completely." *Aëdes vinsoni.* The only known specimen was taken in a house. *Aëdes granti.* Described by Grant as being " very troublesome " (Forbes, 1903). *Aëdes albopictus.* There is general agreement among observers from various parts of the range that this species prefers to bite by day in the shade. Night biting, though not unknown, is comparatively rare. Although readily entering houses in search of blood it is less domesticated than *Aëdes aegypti* (Bonne-Wepster & Brug, 1932, and others) and a number of authors (e.g., Bohart & Ingram, 1946) record it as particularly abundant in woodlands. In the Ethiopian Region Harper (1947) notes that it attacks man readily in the Seychelles and MacGregor's account of its behaviour is typical. This author states (1927) that in Mauritius it is a " voracious and persistent biter in houses, while in woods and forests it frequently attacks in swarms."

Aëdes heischi, langata, calceatus, denderensis and *schwetzi* are not on record as biting man.

The available data regarding the biting cycle have been included in the above summary. Concerning vertical distribution relatively little is known. The only species which have been recorded as definitely acrodendrophilic are *deboeri* (Garnham, 1949), *ruwenzori* (Haddow & Van Someren, 1950), *bambusae* and *angustus* (Haddow, *in litt.*). Lumsden states (*in litt.*) that *subargenteus* has been taken biting in the canopy but does not indicate whether it is more abundant there than on the ground. Forms which seem definitely to prefer the ground are *bambusae kenyae* (Garnham *et al.*, 1946) and *soleatus* (Bailey, 1947 ; Lumsden *in litt.*). With respect to the vertical distribution of breeding-places we have only the observations of Garnham *et al.* (1946), who obtained *bambusae kenyae* larvae from bamboo pots at all heights up to 60 ft. (the greatest height investigated), and Bailey (1947), who obtained *soleatus* larvae from ground level up to 36 ft. (the greatest height investigated).

ZOOGEOGRAPHY

Owing to the relative paucity of records this subject cannot be discussed in as much detail as in the case of species occurring in the West African Sub-region. In spite of this, however, the conjectural distributional areas of most species, as calculated empirically from such records as are available, seem reasonably consistent.

In comparing the two sub-regions the most striking difference is the very much greater diversity of the East and South African fauna. Thus only one species (*pseudoafricanus*) appears to be entirely confined to the West African Sub-region, although two others, *apicoargenteus* and *fraseri*, have such a limited extension outside it that they may reasonably be treated as West African. Even *africanus*, with its vast extension in the Guinean forests, is not clearly West African in origin, though it may be thought that the available evidence, such as it is, suggests an original home in the Uganda savanna. *Aëdes dendrophilus*, though now probably more widespread in the West African savannas than in any other part of its range, is clearly an ancient species with formerly a much wider extension, and there is nothing to indicate in which part of its range it originated. The remaining West African species are either so widespread as to belong to neither sub-region in particular (*luteocephalus, vittatus*), or mainly South and East African with minor incursions into the West African savannas (*metallicus, unilineatus*), or have been so widely distributed by man that their natural distribution has been obscured (*simpsoni*, possibly South African ; *aegypti*, possibly non-ethiopian). In short, the available evidence, meagre though it is, would appear to suggest that the West African *Stegomyia* fauna has been almost entirely derived from that of the surrounding highlands and savannas. This view is also supported by the rather dubious evidence to be derived from morphological resemblances between present-day species. As against this the East and South African Sub-region possesses no less than 27 species, which, as far as we know, are entirely confined within its limits in addition to such others as may be presumed to be at present undiscovered.

Rhodesian Highland species. Chapin's Rhodesian Highland District has two indigenous species, *chaussieri* and *masseyi*, the latter with a close relative, *keniensis*, in the East African Highland District (Fig. 1). The record of *chaussieri* from the Lubilash valley suggests that it may perhaps occur in the Southern Congo Savanna District, in which case it would qualify for inclusion among the West African species, but this record is too imprecise for there to be any certainty on the point, and it has seemed best to treat it in the present paper, since it is clear that, in any case, its main area of distribution is almost certainly in the Rhodesian Highlands. Present records would suggest that both species are confined to the north-eastern part of the district, but it is probable that in fact both extend for a considerable distance westwards into Angola, since, apart from the Bihé plateau, this part of Africa is as yet entirely uncollected. The Bihé plateau is probably above the altitudinal limits of either species, since neither is at present known from above 4,000 or at most 4,500 ft. The southward extension of both species would seem to be very limited to judge by the negative record from Balovale. It is not clear whether the operative factor here is rainfall or altitude since the two are closely correlated in this area. The occurrence of *chaussieri* below 3,000 ft. on the northern face of the plateau, if this could be confirmed, would suggest that rainfall is the effective limiting factor, and in this case both species would probably have rainfall limits resembling those of *africanus*, Balovale, being a borderline locality. *Keniensis* seems clearly to be a highland form of *masseyi*, which it very closely resembles. The record from Fort Hall suggests that in the northern part of its range it may occur below 4,500 ft., but this is a locality associated with very abrupt changes of altitude, and in its present form the record is too imprecise to be of value. It is also possible that *masseyi* may be precluded from the main distributional area of *keniensis* by inadequate rainfall (Njombe, like Balovale, has an average rainfall of 40 in., with 6 dry months). The precise limits of these two species and of *amaltheus* in Northern Rhodesia would be an interesting study, particularly if further light could be thrown on their relationships by the discovery of early stages and males of *masseyi*.

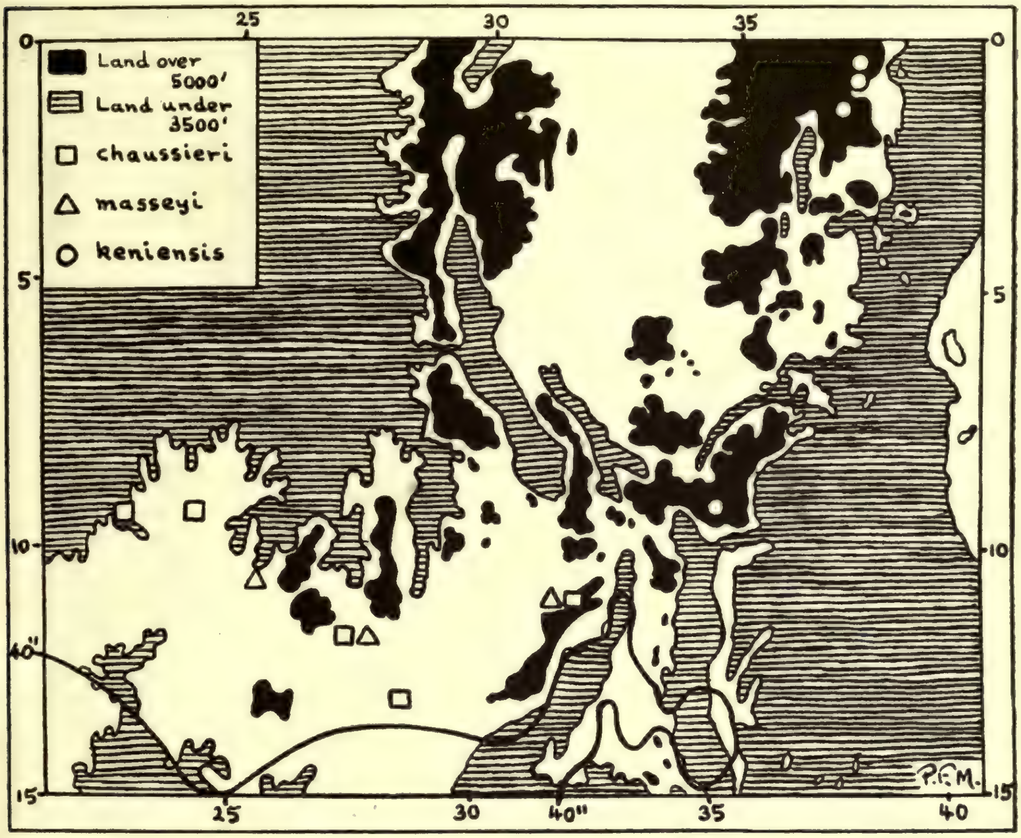


FIG. 1.—Distribution of Rhodesian Highland species and of *Aëdes keniensis*.

Among those Rhodesian species which apparently extend into adjacent faunal districts is *Aëdes schwetzi* (Fig. 2). The only records of this species from outside the district are, however, two from the Costermansville area, and these cannot be finally accepted until specimens are available for examination. Wolfs states (*in litt.*) that only one specimen has been taken in Costermansville itself, and it seems possible that it may be more abundant at the slightly lower level of Ile Shashu. The record from this island is due to Edwards, but the condition of his material is unknown. The relationship of *schwetzi* to *apicoargenteus* has already been discussed, and it has been pointed out that the latter does not appear to occur above 3,500 ft., at most, along the northern edge of the Rhodesian plateau. In this part of its range *schwetzi* is not known from below about 4,000 ft. although further south, at Balovale, it apparently occurs at about 3,400 ft. It appears therefore that the 3,500-ft. contour may be taken as a good approximate boundary between the two species. It will be seen when the East African Highland and the East African Lowland Districts are discussed that this is a very significant altitude over a large part of Africa, bearing comparison with the 6,000-ft. contour on Ruwenzori and in the Kavirondo and other montane areas (Mattingly, 1952). It is possible that it may prove to be a critical altitude for *apicoargenteus* along the western face of the Uganda plateau since, as already noted, the latter is associated with aberrant forms of this species. It is not, however, absolutely preclusive here, as it appears to be further south. As in the case of *masseyi* and *chaussieri* the rainfall limits of *schwetzi* are difficult to assess, but there seems to be no reason to doubt that they are approximately the same as those of *apicoargenteus*. It is interesting to note that *schwetzi* was found at Balovale at a time when *africanus* was apparently absent from there, since there is also some indication that *apicoargenteus* may be slightly more drought-resistant than *africanus* (Mattingly, 1952).

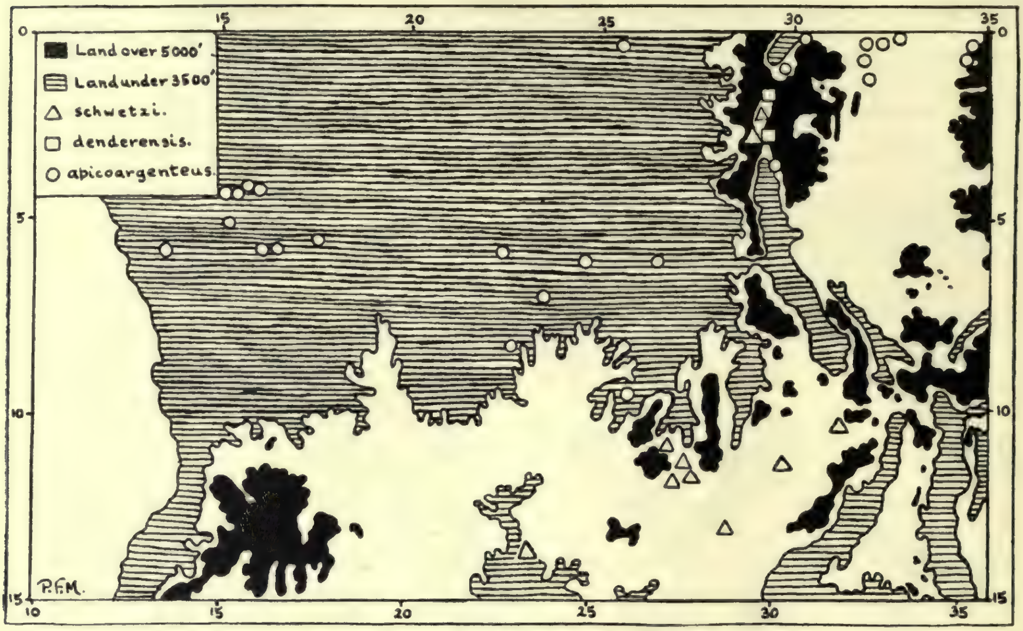


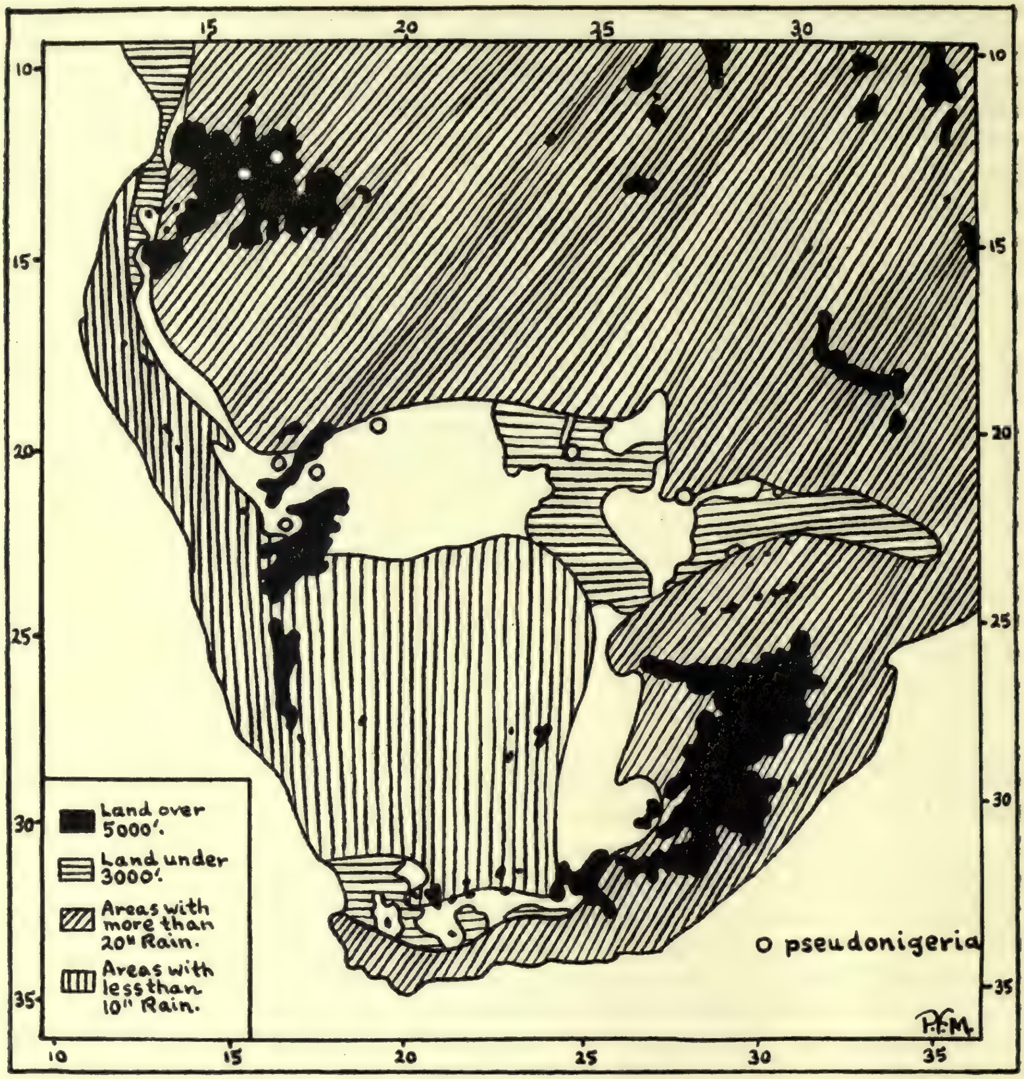
FIG. 2.—Distribution of *Aëdes schwetzi* and allied forms.

Together with *Aëdes schwetzi* it is convenient to mention the closely related *apicoargenteus* ssp. *denderensis*, although the latter is at present known with certainty only from the Kivu highlands and is thus a purely East African Highland species.

Since it is known only from Costermansville little can be said here about its distribution, but it seems reasonable to suppose that it is a highland form of *apicoargenteus* restricted to the Kivu region and perhaps to neighbouring areas of comparable altitude, e.g., in Ruanda-Urundi. The record from Kisenyi cannot be assigned with certainty as between the type form and sub-species since the distribution of the former in Tanganyika is uncertain, while the altitude (4,800 ft.) would probably not preclude it at this latitude (see Mattingly, 1952, fig. 7). In view of the resemblance between the larvae of *denderensis* and *calceatus*, which suggests some affinity with the East African Lowland fauna, even if a remote one, it would be particularly interesting to know more about the distribution of the former. Unfortunately, however, the *Stegomyia* fauna of Ruanda-Urundi is at present almost completely unknown.

Apparently restricted to the southern and western parts of the Rhodesian Highland District are the very interesting species *amaltheus* and *pseudonigeria*, which also extend into the south-east veld and south-west arid districts respectively (Figs. 3, 4). In the southern part of its range *pseudonigeria* appears to be restricted to an area having only 10 to 20 in. of rain in the year. It is rather surprising therefore that it should also be known from the Bihé plateau, where the rainfall is much higher. It seems virtually certain that it does not extend into the eastern part of the Rhodesian Highland District, since it is a vicious man-biter and could hardly have been missed in such well collected areas as Elisabethville and Ndola. It seems reasonable to conclude that the Bihé form is a distinct sub-species, and that it is probably restricted to altitudes of the order of 5,000 ft. and over (Fig. 3). Unfortunately the available material is quite inadequate for a proper comparative study of the two forms. It would seem that the S.W. African form is also a highland mosquito, since it is not known from below about 3,000 ft.

Aëdes amaltheus is at present known only from a very restricted range of altitudes between about 3,000 and 4,000 ft. The lowest mean annual rainfall with which it is associated is about 20 in. and the highest about 40 in. If these are in fact the distributional limits then the population occurring in the more low-lying parts of Southern Rhodesia would seem to be separated from that occupying the main part of the range by the width of the Zambesi valley at Livingstone (Fig. 4). As in the case of the southern boundary of *masseyi* and *chaussieri* it is not clear whether the northern boundary of this species is to be equated with the 40-in. isohyet or the 4,000-ft. altitudinal contour since the two run close together. This is unfortunate, since the question of possible upper rainfall limits in *Stegomyia* is an interesting one. It can only be hoped that the very scanty records from this area will before long be supplemented. In the meantime there seems little reason to doubt that the main distributional area of *amaltheus* covers a large part of southern Angola (not shown in Fig. 4, which covers only the eastern part of the putative range), together with the south-western part of Northern Rhodesia and parts of northern Bechuanaland and Ovamboland. De Meillon & Lavoipierre (1944) express surprise that so striking a species should previously have been overlooked, but in point of fact there were no previous *Stegomyia* records at that time from any part of the main distributional area as here defined. There were, however, some records from Bindura and Shamva in Southern Rhodesia and it is supposed for this reason that the specimens from these localities attributed to *poweri* (Leeson, 1931) may in fact have been *amaltheus*. In view of the fact that proof of the presence of the latter in Southern Rhodesia at present rests on only one female specimen this hypothesis is highly conjectural.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35
Land over 5000'.
Land under 3000'.
Areas with more than 20" Rain.
Areas with less than 10" Rain.
O pseudonigeria
P.F.M.

FIG. 3.—Distribution of *Aëdes pseudonigeria*.

Chapin's South-east Veld District contains at least two very distinct faunal areas, the high veld of the Transvaal and Southern Rhodesia and the humid coastal belt of Zululand, Natal and Pondoland. Both have characteristic species showing interesting affinities with the fauna of the East African Highlands. A large part of the area (Orange Free State, Basutoland and most of Eastern Cape Province) is still unknown as far as its *Stegomyia* fauna is concerned. Information concerning the extreme southern limits of such a species as *contiguus* would be very valuable in assessing the climatic limits of the sub-genus as a whole—an important matter in any speculation regarding its past history.

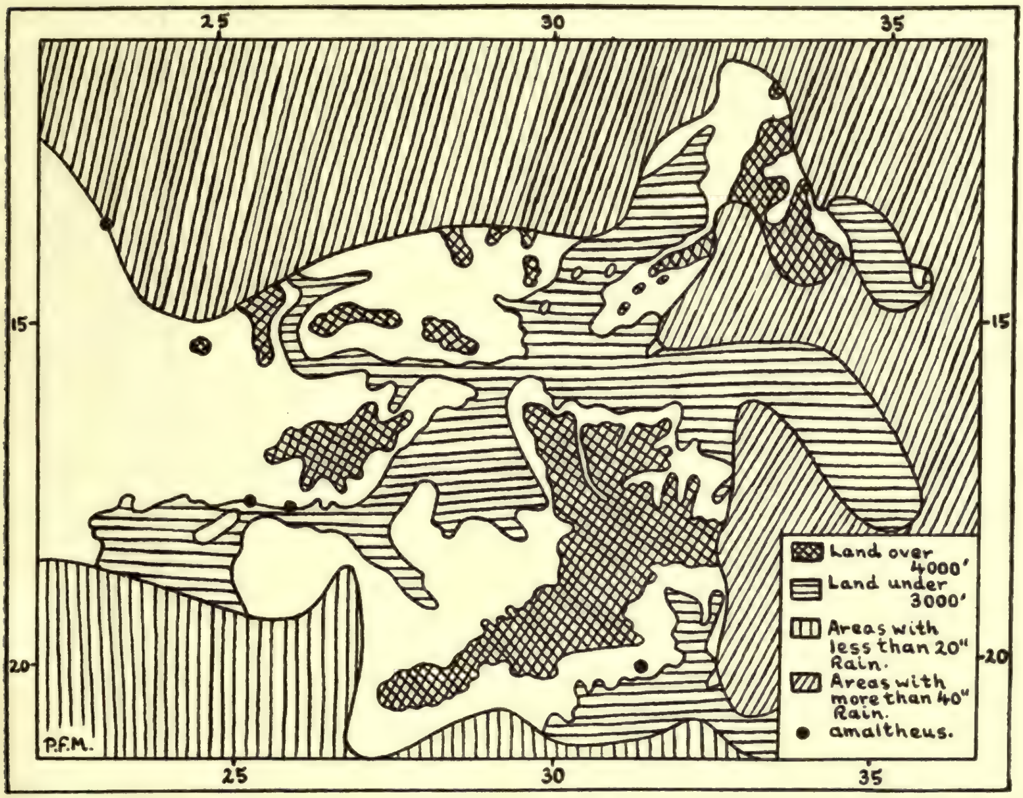


FIG. 4.—Putative distribution of *Aëdes amaltheus.*

Aëdes contiguus is the characteristic species of the High Veld and it is known from nowhere else, but *Aëdes langata,* which appears to be closely related to it and which overlaps with it in Southern Rhodesia, was first described from the East African Highlands (Fig. 5). In so far as confirmed records are concerned both would appear to be highland species with altitudinal limits between 4,000 and 6,000 ft., but unconfirmed records suggest that *langata* at least may occur rather lower, and 3,500 ft. is perhaps nearer the limit for this species. There are also unconfirmed records of *contiguus* from lower altitudes in the Transvaal, and further information is needed before any very critical estimate can be made. It is, however, notable that in general the 3,500 ft. contour appears to approximate to the " boundary " between the East African Highland and East African Lowland faunas. Any attempt to calculate empirical rainfall limits is also rather hazardous, but it is a striking fact that neither species has been found anywhere with less than 20 in. or more than 40 in. of rain (cp. *amaltheus*, above, and *deboeri*, Fig. 6). Applying these as putative limits together with the altitudinal limits deduced above an interesting discontinuous distribution is obtained embracing the Abyssinian and

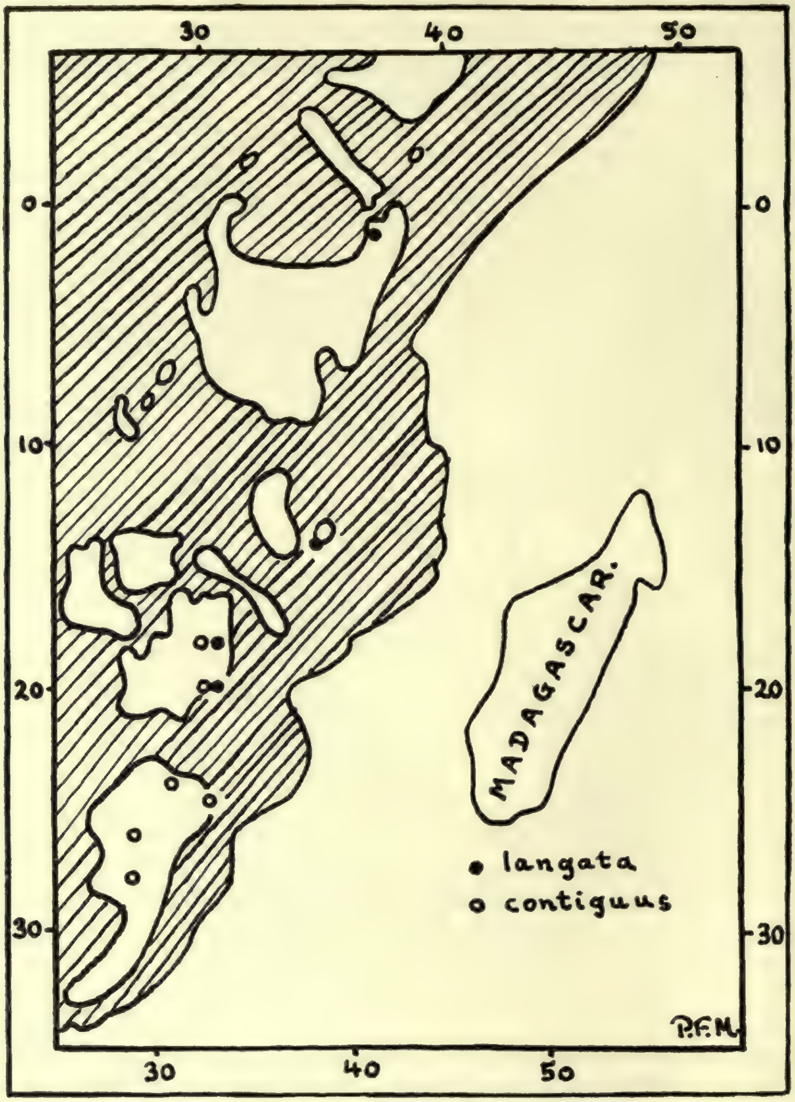


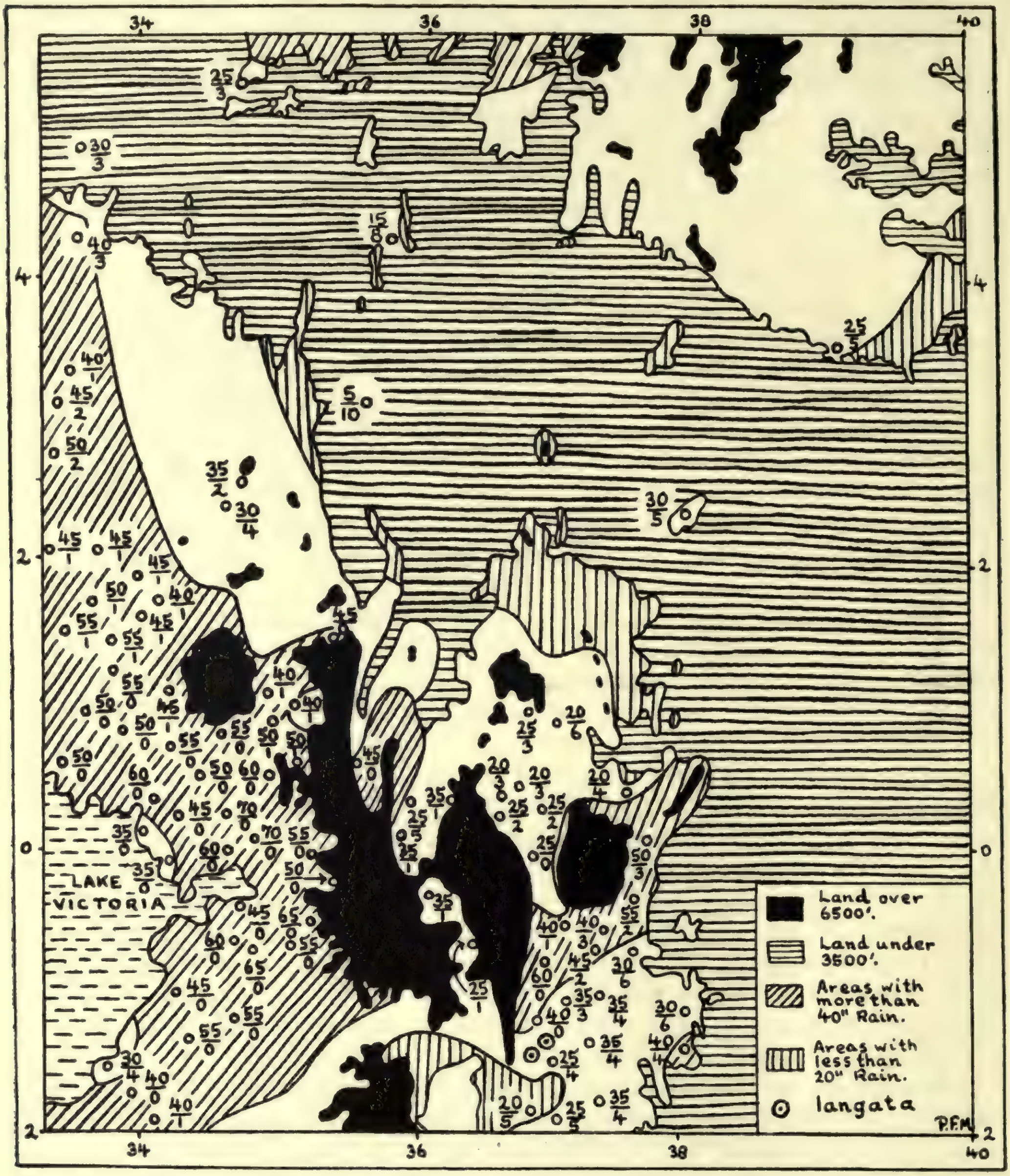
FIG. 5.—Putative distribution of *Aëdes langata* and *Aëdes contiguus*. Only the unshaded areas are within the rainfall and altitudinal limits so far recorded.

East African Highlands and the High Veld. This distribution seems a reasonable one in the light of negative records and of the known distribution of other species of mosquitoes, and suggests the interesting possibility that these species may have an upper rainfall limit, though why this should be so is not at all clear.

The relation between the faunas of the Abyssinian and Kenya Highlands is a particularly interesting one, and it has therefore been thought desirable to include a map showing rainfall in relation to altitude in this region (Fig. 6). This map is based, wherever possible, on selected rainfall figures from the summaries published by the East African Meteorological Service. Few or no records are, however, at present available from the more northerly part of the area, and here use has been made of the isohyets provided by the Rainfall Map of East Africa (E.A.F. No. 1518). The gap between north-eastern Uganda and the area of suitable rainfall in southern Abyssinia seems probably to be purely an altitudinal one and, if based on the 3,000-ft. contour, would be somewhat less extensive than it appears in Fig. 6, where for convenience the 3,500-ft contour, is used. Nevertheless it seems likely to be a more permanent one than the gap between the Guinean Savanna Province and the wetter parts of Abyssinia, which is purely a rainfall one (Fig. 14). Under existing rainfall conditions it seems that the topotypical population of *langata* is isolated from areas of suitable rainfall and altitude in more northerly parts of Kenya, and the absence of records from further north than Nairobi is perhaps not entirely fortuitous. It seems likely that this species achieves its most extensive distribution in Tanganyika.

Aëdes poweri apparently requires a rainfall of at least 40 in. (38·3 in. in the case of the Kologha Forest, *fide* Muspratt, but all rainfall figures in the present paper, as in its predecessor, are expressed to the nearest 5 in.). It occurs, therefore, as far as is known, in the wetter parts of South Africa from Natal to the Eastern Cape Province, as do such species as *demeilloni* and *strelitziae*. It appears to require very well distributed rainfall (2 months with less than 1 in. in the case of the Kologha Forest and no months in the case of the Blaaukrans Forest (Groot Rivier)). Intensive collecting by Mr. Muspratt has failed to reveal it in the coastal lowlands of Natal or in certain upland forests, and it is still not known in what part of Natal the type specimen was taken. It seems reasonable to suppose, however, that in this part of its range it is a highland species, and that it may be regarded on the basis of distribution as well as of morphology as the third and southernmost link in the chain *langata-continguus* (cp. Figs. 5 and 8). It seems not at all unlikely that this species and *contiguus* may overlap in some parts of their range, as do *contiguus* and *langata* farther north.

Aëdes subargenteus, which occurs widely in the coastal parts of Zululand, Natal and Pondoland, is represented by a closely related species or subspecies (*kivuensis*) in the Kivu Highlands (Fig. 7). It also occurs in the lower parts of Chapin's East African Highland District at the southern end of Lake Nyasa and at Taveta. So far as is known the type form does not occur above about 3,000 ft. To judge from its distribution in South Africa it might be expected to require a rainfall of the order of 40 in. or more. Its occurrence at Taveta would not be inconsistent with this, since, as shown in the appendix to the previous paper (Mattingly, 1952), this place has a higher effective rainfall than the annual total of 26 in. would suggest. Without local information it is impossible to explain the Fort Johnston records in similar terms, but it seems possible that here too some unusual local factors may operate. Regarding *kivuensis* it seems probable that it is confined to some of the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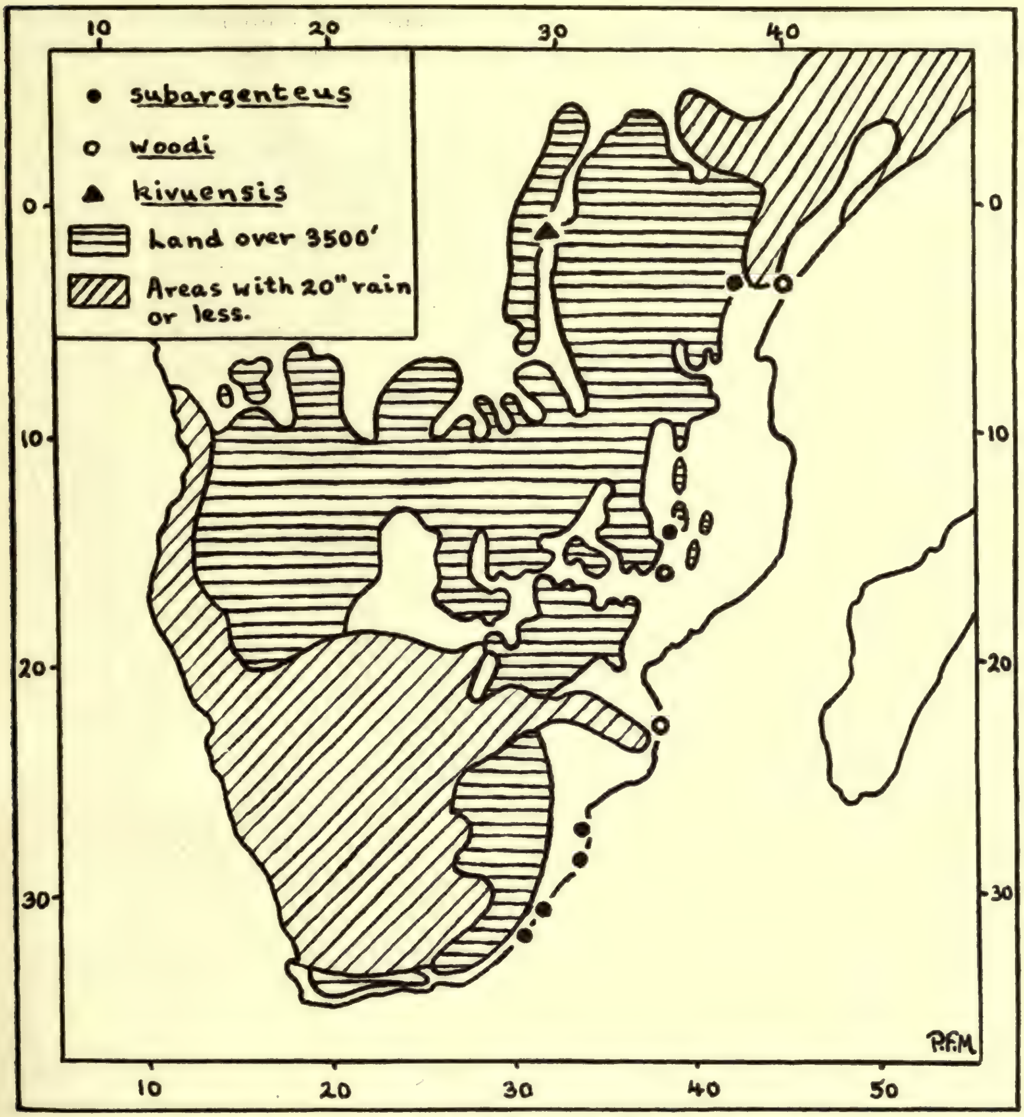
0
2
LAKE
VICTORIA
Land over 6500'.
Land under 3500'.
Areas with more than 40" Rain.
Areas with less than 20" Rain.
Iangata
P.F.M.

FIG. 6.—Details of rainfall and altitude in the Abyssinian and East African Highlands.

Mfumbiro vulcanoes and perhaps to parts of Ruanda-Urundi. It is interesting to note that Edwards and Gibbins failed to find it on Mgahinga or Sabinio.

Somewhat resembling *subargenteus*, though perhaps more nearly allied to *simpsoni* and *strelitziae*, is *Aëdes woodi*, which is known only from three very scattered localities in the South-eastern Veld, East African Lowland and East African Highland Districts respectively. It is curious that this species does not extend as far south as the coastal belt of Natal where other members of the group are so abundant,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● subargenteus
○ woodi
▲ kivuensis
Land over 3500'
Areas with 20" rain or less.
R.F.M.

FIG. 7.—Distribution of *Aëdes subargenteus, kivuensis* and *woodi.*

but so little is known about it that speculation on this point would be useless. Of the other species known from the South-eastern Veld District *calceatus* and *soleatus* are discussed below in connection with the East African Lowland District. *Aëdes strelitziae* and *Aëdes demeilloni* appear to be entirely confined to the area of Zululand, Natal and Cape Province, having the very equitably distributed rainfall which has been shown to be characteristic of *dendrophilus* (Mattingly, 1952). *Aëdes strelitziae* does not appear to have been found much above sea-level, but the record of *demeilloni* from the Impetyeni Forest suggests that this species may occur at considerable altitudes. The record is too imprecise to give much idea of the altitudinal limits, but the presumptive limit of 5,000 ft. shown in Fig. 8 is probably an extreme one, and some of the areas shown as possibly suitable may well be in fact too high.

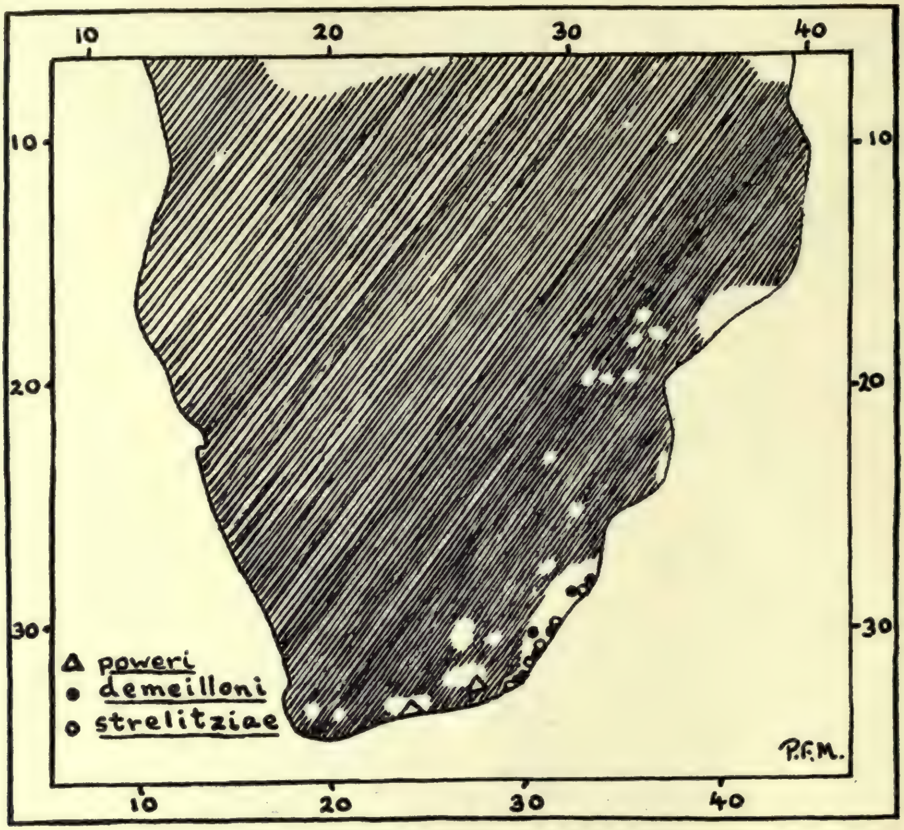

FIG. 8.—Distribution of *Aëdes poweri, demeilloni* and *strelitziae*. Unshaded areas agree approximately in rainfall and altitude with the area in which these species have been found.

Among the East African Highland species *keniensis, langata* and *kivuensis* have already been mentioned. So large a part of this district is still uncollected that nothing more can usefully be said about their distribution. The distribution of the *deboeri* group is of particular interest owing to the intergrading of *deboeri* itself with the so-called *bambusae* ssp. *kenyae* of the East African Montane District. It seems probable that the latter is in fact either a distinct species or else a subspecies of *deboeri*. The striking yellow markings which have led to its being associated with *bambusae* appear to be characteristic of species inhabiting the montane bamboo forests, and are shown equally by *angustus, bambusae s. str.* and *ruwenzori*. Under these circumstances a fuller knowledge of the distributional limits of *deboeri* and of its variation in relation to altitude is much to be desired. At present the only record from below 5,000 ft. which can be checked is that from Marangu, and the records from Mombo and Moshi therefore appear doubtful, but more material is badly needed from this part of Africa. The upper limit of *deboeri*, as far as is known, is about 6,500 ft. The lower limit of *kenyae* is apparently about 5,000 ft. on the western face of the Kenya highlands, but on the eastern face, where it might possibly overlap with *deboeri*, it is not known from below about 8,000 ft. (Fig. 9). In this connection it is interesting to note that at lower altitudes it is recorded as breeding mainly in tree-holes and shaded rock-holes unlike *bambusae s. str.*, which is known only from bamboos. In this respect its habits are more in accordance with those of *deboeri*. It may also be noted that the two forms are separated by a rather well-marked rainfall factor, since *kenyae*, in so far as is known, is restricted to the wetter western part of Kenya, while *deboeri* is known only from the drier eastern part (cp. Figs. 6 and 9). The known rainfall limits of *deboeri* are 35 in. to 40 in. or 35 in. to 50 in. if the record from Marangu is included. The fact that, unlike *keniensis*, it has not been recorded from the area of rather higher rainfall around Mt. Kenya may suggest that its upper limit is about 40 in. and the Marangu form is a distinct species or sub-species but much more evidence is required on this point. However, the Rhodesian Highland affinities of *keniensis* and those of *langata* with the fauna of the South-eastern Veld do seem to be reflected in their respective distributions in Kenya, where the latter appears to have the same rainfall limits as *deboeri*. Morphologically *deboeri* shows some resemblance to *heischi*, and to *demeilloni* so that it might perhaps be regarded as the East African Highland representative of the East African Lowland fauna. On the other hand, as already indicated, it clearly has very close affinities with *bambusae kenyae*, and so might be regarded as a derivative of the East African montane fauna. At the present time there is too little evidence to favour either hypothesis. Nor need they be mutually exclusive, and the view that *deboeri* has been derived from the *heischi* group and *kenyae*, in turn, from *deboeri* has much to commend it. Much more material is required, especially from Tanganyika, before any hypothesis can be given very much substance.

Among the East African Montane forms other than *kenyae*, *Aëdes bambusae s. str.* and *Aëdes angustus* are, as far as is known, confined to the mountains of the Kivu, Mfumbiro and Kigezi regions, while *Aëdes ruwenzori* is isolated further to the North on the Ruwenzori range. The single record from the Kibati lava plain suggests that *kivuensis* may be confined to certain of the Mfumbiro volcanoes or it may occur in Ruanda-Urundi. These are all highly interesting species, and it seems certain that others equally interesting await discovery on the many uncollected mountains of Africa. The importance of montane species for the understanding of the relationships of the Ethiopian fauna as a whole are such that any new evidence will be most welcome ; for the present all that can be done is to place the few available facts on record.

Among East African Lowland species *heischi* is of particular interest owing to the diverse affinities suggested by its morphological characters, which recall *deboeri*, from the East African Highlands, the *calceatus* group from the East African Lowlands and *demeilloni* from the coastal part of the South-eastern Veld. In assessing its rainfall requirements the record from Taveta requires to be approached with caution for reasons given above, and it would seem, in general, to require at least 40 in. In this respect it approximates most closely to *demeilloni* among the species mentioned, and it certainly resembles this species most closely on larval characters. It seems therefore that it probably represents a South-eastern Veld element in the East African Lowland fauna. The same is true of *woodi*, although in this case the affinities are with *simpsoni* and *strelitziae* rather than with the *demeilloni* group. The other East African Lowland species, *calceatus* and *soleatus*, appear to require less rain, and both are known from localities with only 25 in. Both species have been recorded from the South-eastern Veld and East African Highland Districts,

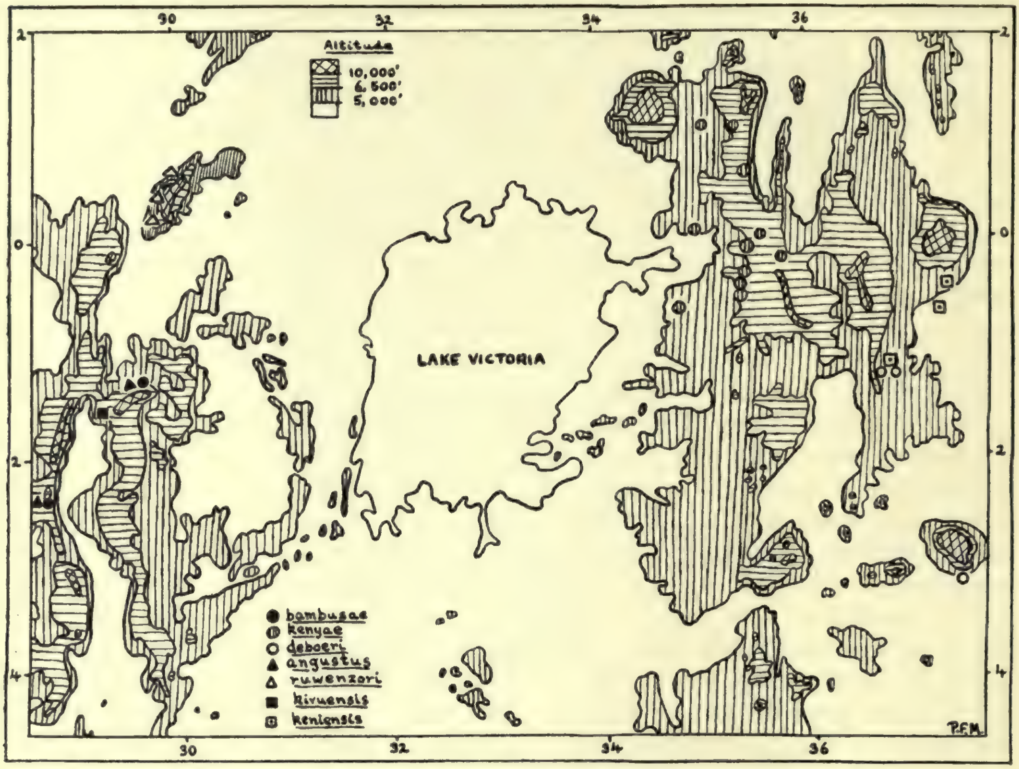

FIG. 9.—Distribution of East African highland and montane species.

but it is in the East African Lowland District that they appear to attain their widest distribution. Records from the Chindamora Reserve and from Ndanga cannot at present be accepted, since no specimens are available from either locality. The record of *calceatus* from the Langata Forest almost certainly concerns a distinct species or subspecies, as explained above under "Taxonomy." Apart from these the only records from above 3,500 ft. are those from Bindura (Edwards, 1941) and of *soleatus* from Mlanje. No specimens from Bindura have been seen, and the record from Mlanje is based on one female only. This specimen is in good condition and seems quite typical but its identity requires confirmation. In any case neither record need necessarily imply occurrence above 3,000 ft., since both localities are associated with abrupt changes of altitude. It would seem therefore that both species may be regarded as being limited largely, if not entirely, by the 3,500 ft. contour (Fig. 10); certainly everything at present known about the East African

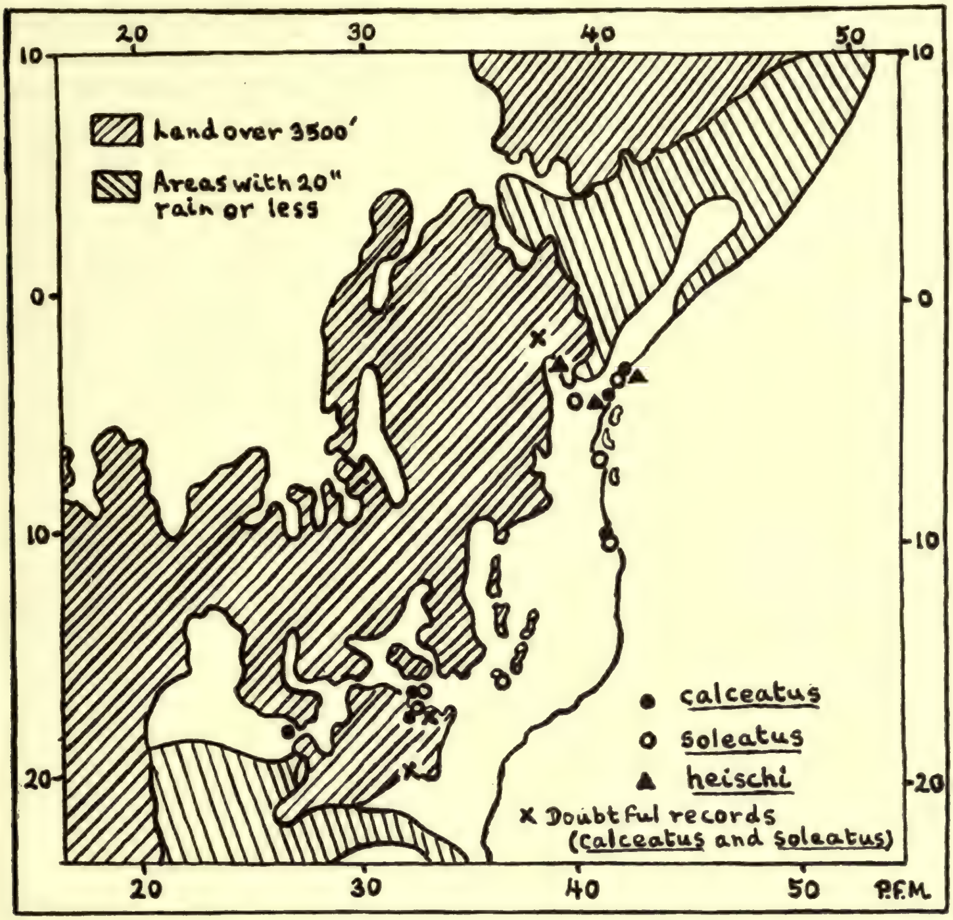
20
30
40
50
10
0
10
20
Land over 3500'
Areas with 20" rain or less
● calceatus
○ soleatus
▲ heischi
× Doubtful records (calceatus and soleatus)
P.F.M.

FIG. 10.—Distribution of the *calceatus* group.

Highland and East African Lowland *Stegomyia* suggests that the two districts are best defined by an altitudinal boundary of this order. The very interesting records from Northern Zululand, sent by Mr. Muspratt while this paper was in the press and not therefore included in Fig. 10, probably represent the southern limits of the two species. In neither case do the rainfall limits appear to be at all clearly defined except that 25 in., perhaps, represents a minimum.

There remain for discussion only the island species. Of these *Aëdes mascarensis* and *Aëdes vinsoni* are apparently restricted to Mauritius. The relative distributions of the two forms on the island cannot be discussed since the number of precise locality records is negligible. Their resemblance to pale forms of *aegypti* is, however, so striking and of so much interest that it has been thought desirable to show their distribution in relation to that of such of these forms as occur in the Ethiopian Region (Fig. 11). The forms in question are referred to collectively by Edwards (1941) as " var. *queenslandensis* Theo.," but it is preferred to treat them here as var. *queenslandensis* Edwards *nec* Theobald, since there are many pale forms occurring in various parts of the world, and we have as yet no evidence as to their origin or genetical constitution. Under the circumstances it seems best that the name *queenslandensis* Theo. should be restricted to the North Australian form on which Theobald (1901) based his type description. Mathis (1934) has shown that the laboratory bionomics of a number of strains from different parts of the world are similar and there has been a small amount of other work on these lines, but there would seem to be a case for a more thorough investigation from a genetical standpoint. Few attempts to cross pale and dark forms appear to have been made, but Dr. Mara has informed me in conversation that they hybridise readily in Eritrea. The matter is of particular interest in the present connection because there are in the British Museum some *aegypti* from Mauritius which are quite markedly pale in colour. It seems possible that this may have some bearing on the curious statement by MacGregor (1927) regarding the distribution of *aegypti* on that island. According to MacGregor, " for some inexplicable reason it is restricted to the coastal belt, in which, moreover, it has locally a very circumscribed distribution. In Rodriguez, however, the species is much commoner, and occurs all round the island up to a level of at least 800 feet." A purely coastal distribution of *aegypti* in Mauritius might conceivably be explained by the fact that the local form was derived mainly from introduced " *queenslandensis*," since the distribution of this form on the mainland is almost entirely coastal (Fig. 11), the few exceptions being localities which are in close and constant communication with ports either by rail or waterway (e.g., Degema, Lokoja, and see Lewis, 1945). To explain this coastal distribution in terms of altitude or rainfall is not very easy. Although they seem normally to be restricted to localities at or near sea-level, pale forms are on record from at least four localities at considerable altitudes (Gebeit, Harrar, Mecca, Sinkat). These are, however, all in very hot parts of the range. It is possible that they may represent temporary introductions and here, even more than in most cases owing to the factor of human transportation, it is necessary to bear in mind the possibility of seasonal extensions of range. Certainly the temperature factor seems likeliest in the present case to limit distribution, and it is interesting to note that Jepson *et al.* (1947) have expressed the opinion that it is through the operation of this factor that *Anopheles gambiae* is largely excluded from areas above 1,000 ft. in Mauritius. It would seem that the temperature gradient on the island must be very steep. The rainfall picture is a complicated one. This is a form showing greater powers of resistance to drought than any other *Stegomyia*, not even excepting *vittatus*, and yet it is known not only from places with moderately high rainfall (the palest of all the specimens in the British Museum comes from Dar-es-Salaam), but even from those in which the rainfall figure approaches or exceeds the three-figure mark (Bonny, Degema, Old Calabar, Porte Victoria, Principe Island). Here the explanation seems almost certain to be casual introduction from drier areas, and it seems reasonable to assume that this is by nature a drought-adapted form from the Red Sea littoral which has been introduced into coastal localities, often with high rainfall, where it is capable of surviving without immediate reversion to the "typical" colour. If this explanation is correct than it would seem that we have to deal with a comparatively well defined and stable genetical entity rather than with a number of local aberrations of independent origin. It is not within the province of the present paper to discuss the distribution of *aegypti* in non-Ethiopian Africa (for

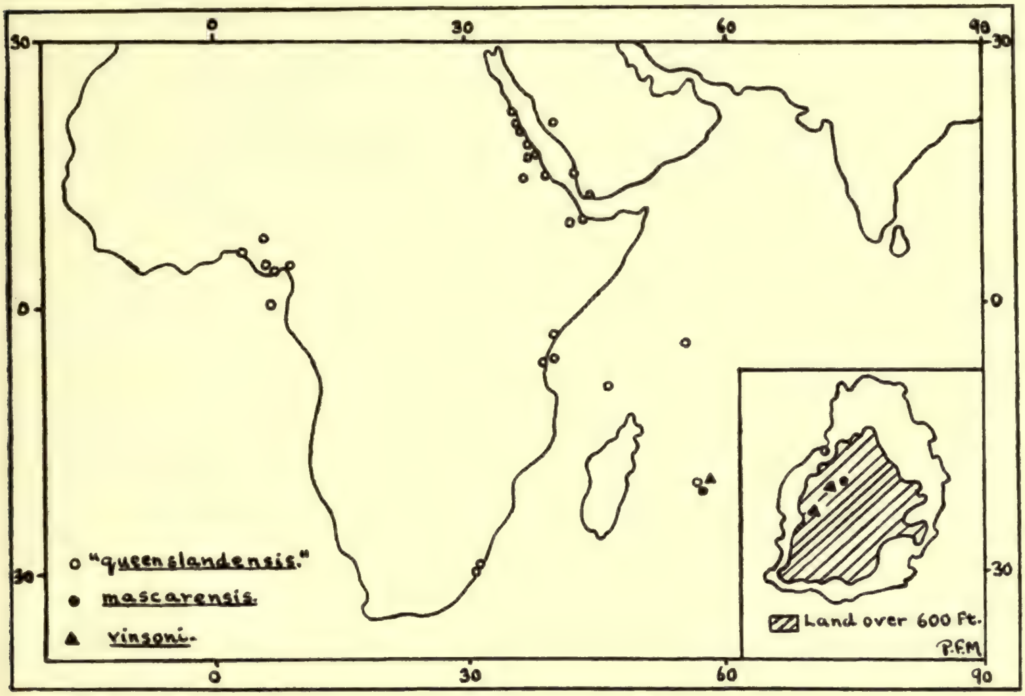

FIG. 11.—Distribution of pale forms of *Aëdes aegypti* and of *Aëdes mascarensis* and *vinsoni* in the Ethiopian Region. Inset: Map of Mauritius.

which see Kumm, 1931*b*, Callot, 1938, and Senevet, 1939), but it may be noted that the reference to colouring made by Linnaeus (1762) in his type description suggests that this was based on a pale form. Such forms certainly occur in Egypt, and the British Museum has a series from Alexandria. Mr. Lewis states (*in litt.*) that pale forms occurring inland in semi-desert areas in the extreme north of the Sudan appear rather different from the coastal forms discussed above. On distributional grounds it would not be at all unreasonable to suppose that the Mediterranean and Red Sea populations are distinct. Details of the distribution of pale forms of *aegypti* in the Ethiopian Region are given in Appendix III. Returning to the position in Mauritius, it may be noted that if the conditions observed by MacGregor still prevail, then *mascarensis* and *vinsoni* may well be largely isolated from *aegypti* either by rainfall or by temperature barriers, since there are no records of either species, susceptible of confirmation, from below about 1,000 ft. A local survey of the relative distribution of the three forms would be of considerable interest.

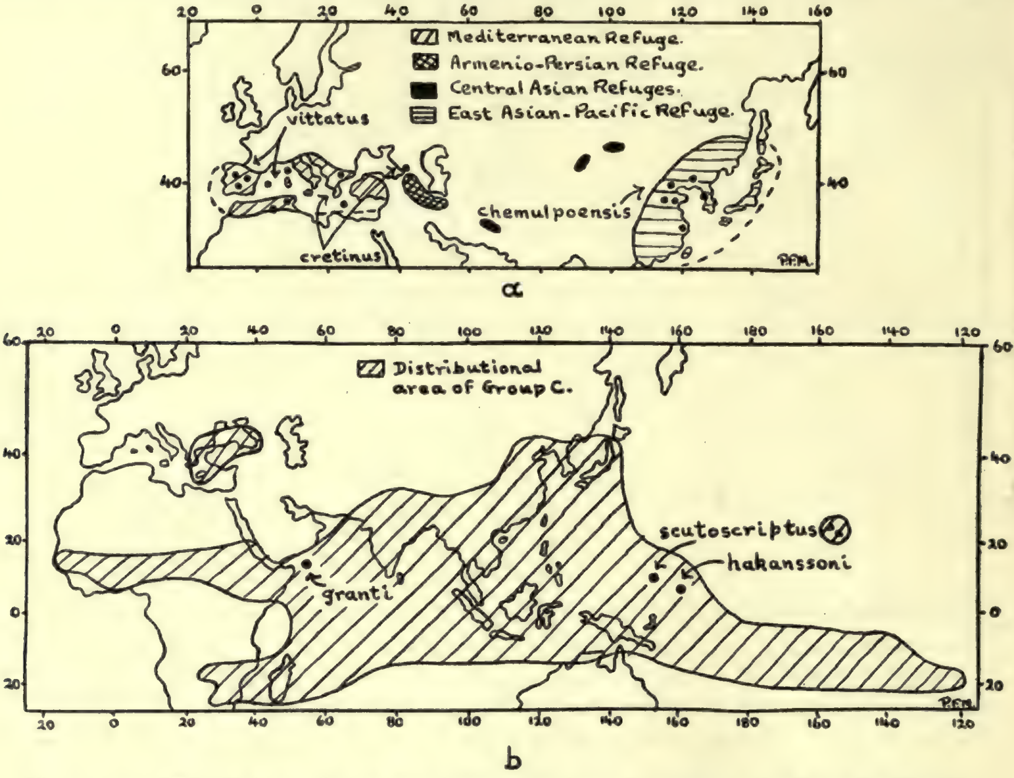
▨ Mediterranean Refuge.
▩ Armenio-Persian Refuge.
■ Central Asian Refuges.
▤ East Asian-Pacific Refuge.
vittatus
cretinus
chemulpoensis
P.F.M.
a
▨ Distributional area of Group C.
scutoscriptus
hakanssoni
granti
P.F.M.
b

FIG. 12.—*a*. Distribution of certain *Stegomyia* spp. in relation to Reinig's Glacial Wooded Refuges. *b*. Distribution of *Aëdes granti* and allied species in relation to that of Group C as a whole. (Since this figure was prepared *Aëdes vittatus* has been found in Sardinia).

Concerning *Aëdes granti* little can be said, since it is known only from a single locality. The mesonotal coloration recalls a moderately pale *Aëdes aegypti*, although on structural characters it appears to be quite unrelated. The abdomen does not show any pale speckling. The distribution of this species in relation to that of its supposed nearest relatives has been discussed above under " Taxonomy." Its distribution in relation to that of Group C as a whole is shown in Fig. 12.

The failure of *Aëdes albopictus* ever to be taken on the mainland of Africa is one of the mysteries of African zoogeography. It is true that over most of its range this species is associated with very heavy rainfall, but in parts of India and in China north of the Yangtse it must encounter rainfalls at least as low as those of most of the East African coast (e.g., Delhi with 30 in. and 6 dry months) while in Mauritius it would seem to occur in coastal localities with less than 40 in. of rain. Under these circumstances it might reasonably be expected at least from Zanzibar, Pemba and Mafia Islands, which have more than 70 in. rain. In fact, however, it seems never to have become established further west than the Seychelles and Madagascar (Fig. 13). The only explanation which can be offered in terms of rainfall is that in the Seychelles and western Madagascar the period of heavy rain is from November to March, whereas in the islands mentioned it is from March to May. Such considerations do not, however, suffice to explain its absence from the wetter parts of the Mozambique coast. It would be interesting to know whether it occurs in the Comoro Islands, and MacGregor's statement that it does not appear to occur on Rodriguez seems to merit investigation. From rainfall considerations the most likely areas for further spread are clearly Zanzibar and its adjacent islands and the small area northwards from Tanga, which has the highest rainfall (about 55 in.) along the whole east coast.

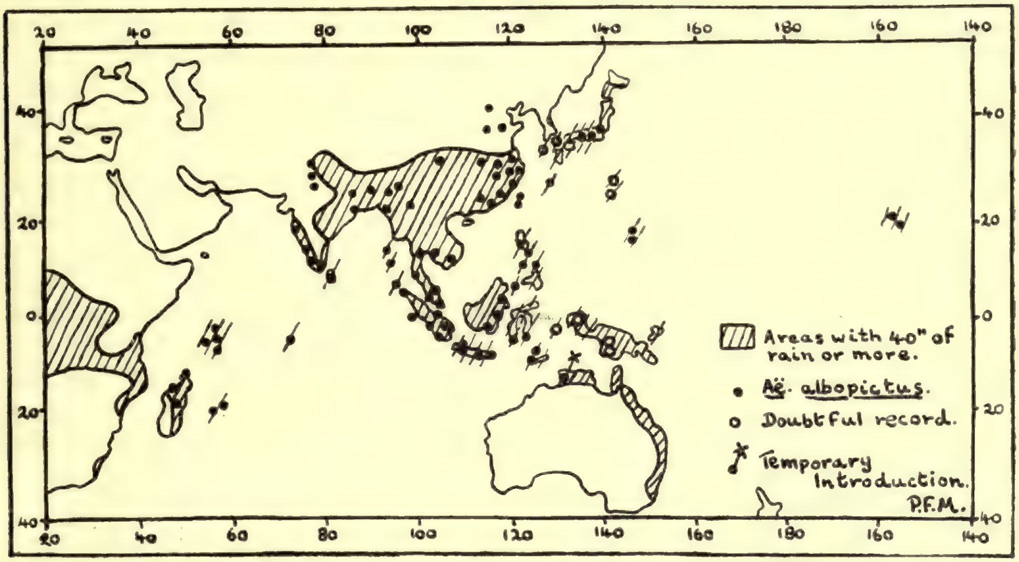

FIG. 13.—Recorded distribution of *Aëdes albopictus*.

SUMMARY

The distribution of those species of *Stegomyia* found in the West African Sub-region has been discussed in a previous paper (Mattingly, 1952). The present paper deals with those species which have not so far been found in the West African Sub-region and are believed to be confined to the East and South African Sub-region. As in the first paper, zoogeography is discussed mainly in relation to rainfall and altitude. It is hoped that it may be possible to discuss other factors, notably temperature and vegetation, in later papers, The present paper, although it deals with many more species, is shorter than its predecessor because less is known about the *Stegomyia* fauna of the East and South African Sub-region than about that of the West African Sub-region. This applies to all aspects of mosquito studies. Studies on taxonomy and relationships are hampered by the fact that males and early stages of a number of species are still unknown, and by the lack of representative series from more than a very few parts of the range. Very large areas in the sub-region have still not been visited by collectors, and certain of these, notably in Tanganyika and Nyasaland, are so situated geographically as to prevent a proper co-ordination of the knowledge so far gained. There appears to be an insufficient awareness on the part of collectors that the eggs of this group are readily obtained by scraping out dry tree-holes and can be easily hatched in the laboratory. They form, in fact, ideal collector's material, since they are almost entirely immune from damage during transport. No large-scale studies on ecology and ethology comparable to those made in Uganda and to a less extent in British West Africa have been carried out anywhere in the sub-region. The very much greater altitudinal diversity of the East and South African Sub-region appears to have led to more extensive speciation than in the West African Sub-region, and here the task of the taxonomist is rendered an especially difficult one, since there is at present insufficient evidence to show how far the variation due to altitudinal factors is at present discontinuous. All the known montane and island *Stegomyia* are at present confined to the East and South African Sub-region, which is therefore of major importance for the study of relationships and the reconstruction of the past history of the group. Certain facts bearing on the relationship between the Ethiopian *Stegomyia* fauna and that of the Palearctic Region are discussed, and it is shown that Group A, which is at the present time entirely Ethiopian (with the exception of *Aëdes aegypti*), must at one time have extended into eastern Asia. This subject will be treated more fully in a later paper, in which an attempt will be made to relate the taxonomy of the Ethiopian *Stegomyia* to that of the sub-genus as a whole.

The present paper includes a description of a new species from Mauritius even more closely resembling a pale form of *Aëdes aegypti* than does *mascarensis*. Reasons are given for transferring *mascarensis* from group B and placing it with the new species in Group A. At the same time an appendix has been added containing details of the distribution of pale forms of *aegypti* in the Ethiopian Region. Other appendices are devoted to further notes on species discussed in the first paper and

to the rainfall of the very interesting region lying between Abyssinia and the Guinean Savanna Province, which was also discussed in that paper.

Other points of interest are the occurrence in the Rhodesias of a recently discovered species (*Aëdes amaltheus*) which is annectent between Groups A and C, the description, here published for the first time, of a larva from South West Africa believed to be that of *Aëdes pseudonigeria*, the discovery of *Aëdes langata* (hitherto known only from Kenya) in Southern Rhodesia, the discovery of *Aëdes subargenteus* (previously known only from Zululand, Natal and Pondoland and, as a supposed subspecies, from the Kivu region) in the neighbourhood of Kilimanjaro, the discovery of a highland member of the *calceatus* group probably a new species or subspecies, near Nairobi, the discovery, on Kilimanjaro, of a curious yellow form of *deboeri* which may eventually throw some light on the interesting problem of the relationship of this species to " *bambusae* ssp. *kenyae* " and the discovery, for the first time outside the Lagos area, of *Aëdes pseudoafricanus* at Banana near the mouth of the Congo. The male of *Aëdes woodi* and the adults and larva of a new subspecies of *Aëdes dendrophilus* are described for the first time. The very recent discovery of *Aëdes keniensis* at Njombe in the Livingstone Mountains lends support to the opinion, already formed from its resemblance to *masseyi*, that it represents a Rhodesian element in the East African Highland fauna. An unassociated larva is described which is believed to be that of *masseyi*. Despite the relative paucity of records it seems reasonably clear that for the purposes of the present group the East African Highland, Rhodesian Highland and East African Lowland Districts may be closely defined by altitudinal boundaries of the order of 3,500 ft. The East African Montane District seems to be similarly definable by a boundary in the neighbourhood of 6,000 to 6,500 ft., but it is to be noted that these altitudinal boundaries appear frequently to be associated with significant rainfall limits.

Short notes on taxonomy and bionomics in relation to distribution are included. Topographical details and references to literature are confined to those which were not included in the first paper.

APPENDIX I

FURTHER NOTES ON SPECIES OCCURRING IN THE WEST AFRICAN SUB-REGION

Since the publication of the first paper in this series a number of further distribution records have been obtained for species occurring in the West African Sub-region. These are listed below. The abbreviations used are as follows: B.M., British Museum (Natural History); K.I., Koninglijk Instituut voor den Tropen, Amsterdam; Terv., Musée du Congo Belge, Tervuren.

Aëdes apicoargenteus

FR. CAMEROONS. Oyom-Abang (near Yaoundé), Evodoula (B.M.). FR. EQUATORIAL AFRICA. Brazzaville (Grjebine, 1950). BELGIAN CONGO. Kapanga, Matadi, Mwene-Ditu, Rutshuru (Terv.), Popokabaka (B.M.). UGANDA. Kasunganyanja, Namalu (Haddow, *in litt.*), Ntotoro East, Tokwe (Lumsden, 1951), Ntaya Swamp

(Smithburn & Haddow, 1951), Nyagak Forest (Lumsden & Buxton, 1951). KENYA. Kodera (Garnham & McMahon, 1947).

Aëdes fraseri

FERNANDO PO. Boloko, Botonós, San Carlos, Santa Isabel (Gil Collado, 1936). UGANDA. Ntotoro East (Lumsden, 1951).

Aëdes dendrophilus

BELGIAN CONGO. Kimilolo River (Terv.), Kisanga River (Mattingly & Lips, in press), Elisabethville (Muspratt, *in litt.*). UGANDA. Ntotoro West (Lumsden, 1951). KENYA. Kwale (B.M.). N. RHODESIA. Serenje (B.M.). NATAL. Scottburgh (B.M.).

Aëdes africanus

DAHOMEY. Ouidah (Huttel, 1950). FR. CAMEROONS. Oyom-Abang (near Yaoundé), Evodoula (B.M.). BELGIAN CONGO. Banzyville, Eala, Gombi-Masaka-Kibanzi, Kabila, Kabukulu, Kakulubu, Kambundi, Kianga, Kibulu, Kimilolo River, Kinkosi, Kisantu, Kitutu, La Kafubu, Leopoldville, Mangembo, Mubanga, Mulassu-Tugi, Mwela, Popokabaka, Tukisi, Zundu (Terv.), Kasapa River, Kiniama, Kisanga River (Keyberg), Lofoi River (Kundelungu Plateau), Luano (B.M.). RUANDA-URUNDI. Usumbura (Terv.). UGANDA. Kaabong, Kasunganyanja, Labwor (Haddow, *in litt.*), Lunyo (Gillett *et al.*, 1950), Ntotoro East, Ntotoro West, Tokwe (Lumsden, 1951), Ntaya Swamp (Smithburn & Haddow, 1951), Nyagak Forest (Lumsden & Buxton, 1951). ABYSSINIA. Jimma (Giaquinto-Mira, 1950). KENYA. Kodera (Garnham & McMahon, 1947), Cheborget, Mambwa (E.C.C. Van Someren, *in litt.*); TANGANYIKA. Ukara I. (B.M.). N. RHODESIA. Serenje (B.M.).

Aëdes pseudoafricanus

BELGIAN CONGO. Banana (as *africanus* Wanson, 1935).

Aëdes simpsoni

FERNANDO PO. Biapa, Musola, Rebola (Gil Collado, 1936). BELGIAN CONGO. Bili (De Meillon & Lavoipierre, 1944), Albertville, Inongo, Kazungeshi, Kibati, Kimilolo River, Komi, unnamed locality between Libenge and Lisala, Ngbandi, Thysville (Terv.), Kinanyira (Uvira area) (B.M.). RUANDA-URUNDI. Usumbura (Terv.). UGANDA. Kaabong, Kasunganyanja (Haddow, *in litt.*), Ntotoro East, Ntotoro West, Tokwe (Lumsden, 1951), Koich-Kenya River Junction (Lumsden & Buxton, 1951), Bageza (near Mubende), Bugazi (on Kome Island), Bunono, Buwaya, Kitubulu, Seguku (all near Entebbe), Hakitengya (Gillett, 1951*a*). ABYSSINIA. Jimma (Giaquinto-Mira, 1950). TANGANYIKA. Mofu (Gander, 1951). NATAL. Port Shepstone, St. Winifred's (B.M.). CAPE PROVINCE. Port St. Johns (B.M.), East London, Mazeppa Bay (Muspratt, *in litt.*).

Aëdes luteocephalus

Belgian Congo. Banana (Wanson, 1935), Elisabethville (Mattingly & Lips, in press). Uganda. Namalu (Haddow, *in litt.*), Mongiro (Lumsden, 1952).

Aëdes unilineatus

Zululand. Ishongwe (Muspratt *in litt.*).

Aëdes metallicus

Belgian Congo. Elisabethville (Mattingly & Lips, in press). Kenya. Kodera (Garnham & McMahon, 1947). Zululand. Ishongwe (Muspratt *in litt.*).

Aëdes vittatus

Dahomey. Abomey (Huttel, 1950). Fr. Equatorial Africa. Brazzaville (Grjebine, 1950). Belgian Congo. Albertville, Banzyville, La Lufira, Lubumbashi River, Ngbandi, Sesenge-gadin (Terv.). Uganda. Kaabong, Kamion (Haddow, *in litt.*), Ntotoro West (Lumsden, 1951). Sudan. Between Suakin and Erkowit (as *sugens*, King, 1908). Arabia. Jebel Jihaf (B.M.). Abyssinia. Moyale (La Face, 1939), Guder (Giaquinto-Mira, 1950). Eritrea. Barentu (Giaquinto-Mira, 1950). It. Somaliland. Burhacaba (Zavattari *in* Tedeschi & Scalas, 1934). S. Rhodesia. Msonneddi (Edwards, 1940), Domboshawa (K.I.).

Aëdes aegypti

Cape Province. Additional southerly records kindly sent me by Mr. Muspratt are East London and Port Alfred. He notes that this species has not so far been found in Port Elizabeth or further westward. Dr. Mara has informed me in conversation that he cannot accept my suggestion that his record of *aegypti* from Mt. Bizen indicates a casual introduction. He tells me that it has since been found there repeatedly and appears to be well established.

Records from outside the Ethiopian Region additional to those given in the first paper are as follows :

Aëdes unilineatus

India and Pakistan. Karachi (Hicks & Diwan Chand, 1936), Nilgiri Hills (Russell & Mohan, 1942), Kohat (Qutubuddin, *in litt.*).

Aëdes vittatus

Balearic Is. Raxa-Caubet (Mallorca) (Canamares, 1951). Corsica. Bucalojo River Gorge, San Nicolao, West Coast near Ajaccio (Aitken, *in litt.*). Sardinia. Cantoniera Ovile Cannas, Picocca River Gorge, Villanovatulo (Aitken, *in litt.*). India. Hyderabad City (Deccan) (Qutubuddin, 1951), Nedumangad, Kalkulam (Iyengar 1938).

The discovery of specimens of *dendrophilus* in the Tervuren Museum, where they had been placed under *Aëdes fraseri*, is of interest as this species has only very recently been recorded for the first time from the Katanga (Mattingly, 1952). The specimens, unlike that on which the previous record was based, are in good condition and seem typical, although males and early stages are still required for final confirmation. In the appendix to my first paper it was suggested that the occurrence of this species so far outside its known rainfall limits might be due to the presence of gallery forest, but Monsieur Lips informs me that this forest and others from which *Aëdes africanus* is recorded above are of a special type known locally as Muhulu, which is denser and more humid than ordinary gallery forest and is associated mainly with the sources and head-waters of streams. There is no doubt that it is an important distinction, and the resemblance to the type of forest in which *Aëdes africanus* was found at Taveta is striking (see appendix to first paper). Synecological observations of this kind are felt to be of great value, and it is considered that they may well have an important part to play in the further development of mosquito research. Mr. Muspratt's record from Elisabethville is based on a unique female in the S.A.I.M.R. collection. The records of *dendrophilus* and *africanus* from Serenje are each based on a unique female specimen. The rainfall here appears to have an even less equable seasonal distribution than at Elisabethville since there are, on an average, 7 months with less than 1 in. of rain. Serenje is, however, situated on a high plateau, and it seems possible that forest of the Muhulu type may occur there. The record of *dendrophilus* from Kwale is associated with one of the isolated areas shown in Fig. 9 of the previous paper as having a type of rainfall suited to this species. It may well represent a distinct subspecies. The taxonomic status of this and other isolated populations will be discussed in a later paper in the series. As noted in the previous paper, the record of *africanus* from Ukara Island was based on a single larva. It has now been possible to confirm it from a series of ten female adults. The record of *unilineatus* from Karachi is of special interest since it is associated with detailed rainfall data. It is based on a mosquito survey, which may be taken for practical purposes to have lasted from the beginning of May to the end of October, 1935. Rainfall during this period was as follows: May 0·0, June 0·0, July 1·04 in., August 0·30 in., September 0·15 in., October 0·02 in. During the period in question adults were found during August only. No larvae appear to have been found. The mean annual rainfall over the previous six years was 10·2 in., with a minimum of 0·69 in. in 1931 and a maximum of 20·82 in. in 1933. 7·17 in. fell in 1934. The number of months with less than 1 in. of rain was 12 in 1931, 8 in 1933 and 10 in 1934. The record of this species from the Nilgiri Hills is interesting as supporting the conclusion already drawn from Barraud's record from Bombay that this species may occur in India in association with higher rainfalls than any as yet recorded for it in Africa. Mr. D. J. Lewis has kindly told me that in his opinion the altitude given for Erkowit in the first paper is too high and that it is in fact of the order of 3,500 ft. Various altitudes appear in the literature. Hurst & Black give 3,600 ft. and the *East and South African Handbook* gives 3,800 ft. Certainly a figure of this order would be in better accordance with those recorded for this species from elsewhere than the figure of 4,300 ft. which I have quoted (see Mattingly, 1952, pp. 262 and 289). The records of *vittatus* from the Balearics and from Corsica and Sardinia are of great interest since they fully confirm the locality recorded for the type by Bigot, on which some doubt has been thrown. The record from Güder is interesting because of the high altitude involved (cp. Mara's negative record from Mt. Bizen). " Chell's Third Camp " quoted in the first paper as an unidentified locality for this species can now be said probably to have been in the Marsabit area (see Edwards, 1941, p. 465). The record from Brazzaville is interesting in view of the paucity of records from this part of Africa noted in the first paper. The record from Jebel Jihaf is associated with an altitude of circa 7,100 ft. This is in good accord with its distribution elsewhere, in contrast to Patton's negative record from behind Aden (see Mattingly, 1952, p. 291). The record of *pseudoafricanus* from Banana is the first from outside the Lagos area. It is based on a long series of specimens in the Congo Museum. This series contained 24 complete males, all of which were dissected and all of which proved to be *pseudoafricanus*. The scutal markings of these and of the accompanying females agree with those of specimens from the Lagos area and may be regarded as diagnostic (see Chwatt, 1949, and Mattingly, 1952). In the Congo Museum the specimens were placed under *africanus*, but it seems that this species probably does not occur at Banana, which has a rainfall of only 32½ in. with 4 dry months (Vandenplas, 1943). The new records of *africanus* do not add materially to our knowledge of its distribution except for that from Usumbura, which provides one of the rare cases of its occurrence in an area with less than 40 in. of rain (35 in. but with only 3 dry months according to Vandenplas, 1943), and that from Kaabong, which probably has a similar rainfall, although this is at present uncertain. It may be noted that experimental evidence is now available to show that the eggs of this species can withstand desiccation for at least 74 days (Gillett *et al.*, 1950). The record from Kaabong is of particular interest in relation to the known occurrence of *africanus* in Abyssinia (see Mattingly, 1952). The record of *apicoargenteus* from Kapanga is from the locality of that name in the Katanga and not from the one in the Leopoldville area (*per fide* Basilewsky). It is of interest as representing the highest altitude from which *apicoargenteus* has been recorded in this part of its range (see Mattingly, 1952). The records of this species from Rutshuru and Usumbura are based on one and two female specimens respectively. Larvae from these localities would be very welcome for comparison with those of *denderensis*. The relatively low rainfall in combination with very equitable seasonal distribution at Usumbura has been noted in connection with *Aëdes africanus*. Its significance would be easier to assess if more recent detailed figures were available. Gillett's paper should be consulted for some further notes on the anomalies in the biting behaviour of *Aëdes simpsoni* discussed in the first paper of the present series. (See also Bruce-Chwatt, 1950.) The record of this species from East London extends its known distribution considerably to the southward.

The following are details of the localities listed above other than those already tabulated in the first paper. Certain localities in the Belgian Congo could not be placed with accuracy without making local inquiries, and as they affect only species having a very wide distribution in this part of Africa it has been considered sufficient to give a rough indication of their whereabouts. Gombi-Masaka-Kibanzi (Coll. Henrard) and Kinkosi and Tukisi (Coll. Fain) have not been traced. There are at least three places by the name of Bili in the Belgian Congo, and De Meillon gives no indication as to which is implied (Coll. Liégeois).

Locality	Altitude	Latitude	Longitude	Rainfall
Abomey, Dahomey	<500	7·08 N.	2·04 E.	(40)
Albertville, Belgian Congo	2,500	5·56 S.	29·13 E.	50
Banana, Belgian Congo	<500	5·59 S.	12·27 E.	30
Banzyville, Belgian Congo	(1,500)	4·17 N.	21·12 E.	(70)
Barentu, Eritrea	(2,000)	15·08 N.	37·35 E.	(15)
Biapa, Fernando Po	(1,000)	(3·20 N.)	(8·45 E.)	<100
Bili, Belgian Congo. Not identified (see above).				
Boloko, Fernando Po	(1,000)	(3·25 N.)	(8·45 E.)	<100
Botonos, Fernando Po	(1,000)	(3·35 N.)	(8·40 E.)	<100
Burhacaba, It. Somaliland	(500)	(2·45 N.)	(44·05 E.)	(25)
Domboshawa, S. Rhodesia	(1,700)	(17·36 S.)	(31·08 E.)	(35)
East London, Cape Prov.	<500	33·01 S.	27·58 E.	35
Evodoula, Fr. Cameroons	1,100	4·00 N.	11·10 E.	(65)
Guder, Abyssinia	(7,000)	(9·00 N.)	(37·45 E.)	(50)
Hakitengya, Uganda	(3,500)	(0·43 N.)	(30·04 E.)	(55)
Mt. Homa, Belgian Congo	(3,000–4,500)	1·15 N.	29·47 E.	(50)
Jimma, Abyssinia	(5,700)	(7·40 N.)	(36·50 E.)	(55)
Kaabong, Uganda	5,000	3·33 N.	34·06 E.	(35)
Kabila, Belgian Congo. Bakali-Inzia District.				
Kabukulu, Belgian Congo. Bakali-Inzia District.				
Kakulubu, Belgian Congo. Wamba-Bakali District.				
Kambundi, Belgian Congo	(3,000)	(5·48 S.)	(17·20 E.)	(65)
Kamion, Uganda	(3,000)	(3·45 N.)	(34·15 E.)	(35)
Kapanga, Belgian Congo	(3,000)	8·20 S.	22·36 E.	(55)
Kasapa R., Belgian Congo	(4,000)	(11·27 S.)	(27·19 E.)	(50)
Kasunganyanja, Uganda	(3,500)	(0·20 N.)	(30·20 E.)	(50)
Kazungeshi, Belgian Congo	(4,800)	(8·57 S.)	(27·22 E.)	(45)
Kianga, Belgian Congo. Wamba-Bakali District.				
Kibulu, Belgian Congo. Kwango Prov.				
Kimilolo R., Belgian Congo	(4,000)	(11·43 S.)	(27·31 E.)	(50)
Kiniama, Belgian Congo	(4,000)	(11·30 S.)	(28·23 E.)	(50)
Kitutu, Belgian Congo. Bakali-Inzia District.				
Kodera, Kenya	(4,500)	(0·30 S.)	(34·20 E.)	(60)
Koich-Kenya River Junction, Uganda	(2,500)	(3·34 N.)	(31·29 E.)	(50)
Komi, Belgian Congo	(1,500)	(3·20 S.)	(23·50 E.)	(70)

Locality	Altitude	Latitude	Longitude	Rainfall
Labwor, Uganda	(5,000)	(2.35 N.)	(33.50 E.)	(45)
La Kafubu, Belgian Congo = Elisabethville.				
La Lufira, Belgian Congo	(4,500)	11.00 S.	26.59 E.	(50)
Lofoi R., Belgian Congo	(5,300)	(10.26 S.)	(27.53 E.)	(50)
Luano, Belgian Congo	(4,000)	(11.36 S.)	(27.36 E.)	(50)
Lunyo, Uganda. See Entebbe.				
Mambwa, Kenya	(6,000)	0.37 S.	35.07 E.	(55)
Mangembo, Belgian Congo	(1,500)	(4.34 S.)	(14.19 E.)	(55)
Mobanga, Belgian Congo	(3,000)	(5.53 S.)	(17.34 E.)	(65)
Mofu, Tanganyika	(2,000)	(8.10 S.)	(36.10 E.)	(45)
Mulassu-Tugi, Belgian Congo. Bakali-Inzia District.				
Musola, Fernando Po. Not identified.				
Mwela, Belgian Congo	(3,500)	(6.02 S.)	(17.40 E.)	(65)
Mwene-Ditu, Belgian Congo	(3,000)	(7.00 S.)	(23.25 E.)	(55)
Namalu, Belgian Congo	(5,000)	(1.45 N.)	(34.40 E.)	(50)
Ngbandi, Belgian Congo. Ubangi District.				
Ntaya Swamp, Uganda	(3,500)	(0.41 N.)	(30.03 E.)	(55)
Ntotoro East and West, Uganda. See Ntotoro Valley.				
Nyagak Forest, Uganda	(5,000)	(2.27 N.)	(30.57 E.)	(50)
Ouidah, Dahomey	<500	6.20 N.	2.05 E.	(40)
Port Alfred, Cape Prov.	<500	33.37 S.	26.58 E.	(30)
Port Shepstone, Natal	<500	(30.45 S.)	(30.27 E.)	(45)
Rebola, Fernando Po. Not identified.				
Rutshuru, Belgian Congo	4,200	1.09 S.	29.25 E.	65
St. Winifreds, Natal	<500	(30.06 S.)	(30.51 E.)	(40)
San Carlos, Fernando Po	<500	(3.25 N.)	(8.33 E.)	<100
Scottburgh, Natal	<500	30.17 S.	30.44 E.	(45)
Serenje, N. Rhodesia	5,200	13.02 S.	30.58 E.	45
Sesenge-Gadin, Belgian Congo	(3,000)	(3.40 N.)	(29.40 E.)	(60)
Tokwe, Uganda	(3,000)	(0.45 N.)	(30.02 E.)	(55)
Uvira, Belgian Congo	2,600	3.24 S.	29.08 E.	35
Zundu, Belgian Congo. Bakali-Inzia District.				

APPENDIX II

RAINFALL OF THE BOR-PIBOR-TORIT AREA

When plotting putative distributional limits of *Aëdes apicoargenteus* in this area it became apparent that the rainfall boundaries, based on empirical limits of 25 in. with 3 dry months, 30 in. with 4 dry months or 45 in. with 5 dry months, instead of following the isohyets and so defining the Guinean and Abyssinian areas of high precipitation as isolated blocks tended to turn towards one another, while the distribution of patches of "forest" as shown by maps suggested that there might exist a connecting bridge in the form of an area of exceptionally well distributed rainfall (Mattingly, 1952). Such a bridge would be of considerable interest to zoogeographers as helping to explain the occurrence of a well-marked Guinean element in the Abyssinian fauna. Thanks to Mr. D. J. Lewis it has been possible to obtain additional rainfall figures for this area, and it has therefore seemed worth while to prepare a detailed rainfall map (Fig. 14). It will be seen that purely on the basis of rainfall figures, two interpretations are still possible (Fig. 15), and the evidence for the existence of such a bridge is therefore still largely that afforded by the distribution of " forest " patches on the map. It seems clear, however, that such a bridge must in any event have existed in comparatively recent times even if we assume only very small long-term fluctuations in rainfall and that, subject to edaphic factors, it would provide a forested connecting path between the two

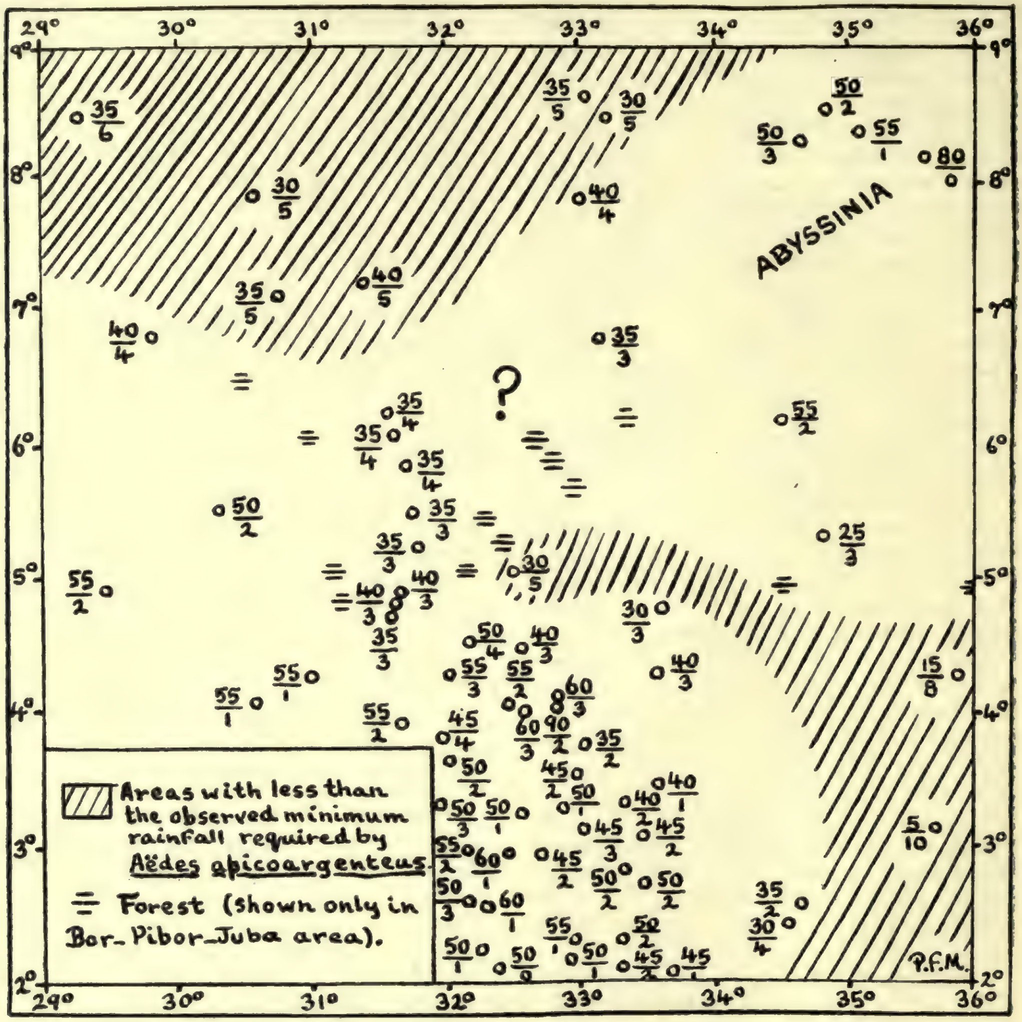
29° 30° 31° 32° 33° 34° 35° 36°
9° 8° 7° 6° 5° 4° 3° 2°
ABYSSINIA
?
▨ Areas with less than the observed minimum rainfall required by Aëdes apicoargenteus.
= Forest (shown only in Bor-Pibor-Juba area).
P.F.M.

FIG. 14.—Rainfall of the south-eastern Sudan and adjacent parts of Abyssinia, Kenya, Uganda and the Belgian Congo.

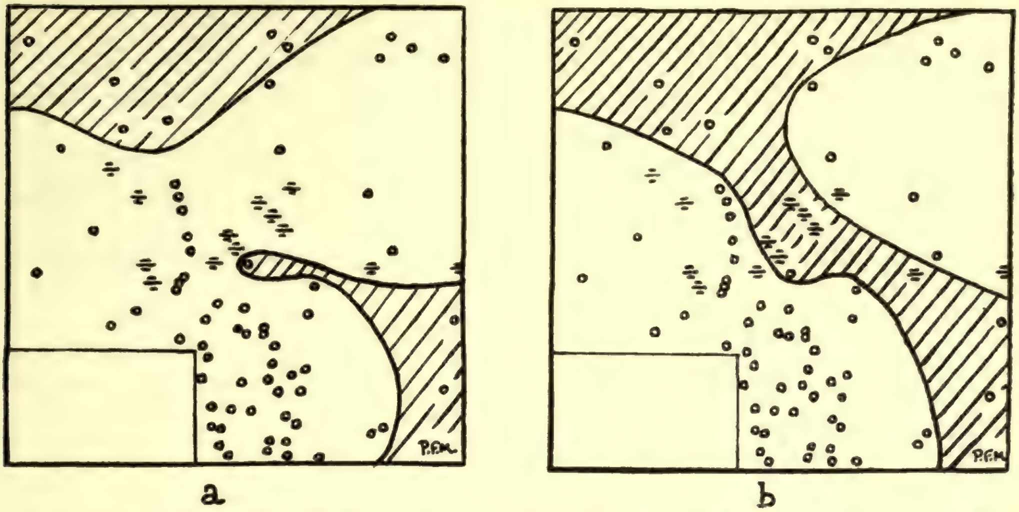

FIG. 15.—Alternative interpretations of the rainfall data illustrated in Fig. 14. Of the two *a* seems the more probable on account of the distribution of forest.

regions. The rainfall figures provided by Mr. Lewis with the assistance of the Sudan Government Meteorologist represent mean annual rainfalls up to 1950. As they have not previously been published they are given below :

Locality	Latitude	Longitude	Rain (mms.)	Rain (Ins. to nearest (5 in.)	Months with less than 1 in.	Years of Average
Akobo	7.47	33.01	972	40	4	30
Boma	6.10	34.29	1317	55	2	8
Bor.	6.12	31.33	860	35	4	30
Gilo	See Katire		2263	90	2	8
Isoke	4.16	32.02	1391	55	3	6
Kapoeta	4.46	33.35	777	30	3	13
Katire	4.03	32.47	1530	60	3	11
Kongor	7.09	31.22	1009	40	5	9
Lafon	5.02	32.28	716	30	5	3
Lerua	4.00	32.34	1514	60	3	10
Loa	3.47	31.58	1068	45	4	6
Loelli	(5.18)	(34.45)	603	25	3	6
Nagishot	4.16	33.34	1017	40	3	14
Nimule	3.37	32.03	1189	50	2	30
Okaru	4.29	32.09	1211	50	4	8
Palataka	4.02	32.26	1395	55	2	7
Pibor Post	6.48	33.08	880	35	3	30
Torit	4.24	32.33	988	40	3	28

Other rainfall figures shown in Fig. 14 are taken from Hurst & Black (1943), and from the summaries of rainfall for the year 1948 (including normals to date) published by the East African Meteorological Department.

APPENDIX III

DISTRIBUTION OF PALE FORMS OF *Aëdes aegypti* IN THE ETHIOPIAN REGION

NIGERIA. Bonny, Old Calabar (Theobald, 1911*c*), Lagos (Summers-Connal, 1926, 1927), Lokoja (Simpson, 1913), Degemma (B.M.).

PRINCIPE I. Unnamed locality (B.M.).

SUDAN. Port Sudan, Suakin, Tokar (Edwards, 1941), Aqiq, Dongonab, Gebeit, Halaib, Kassala, Mohammed Gul, Sinkat (Lewis, 1945).

ARABIA. Aden (Edwards, 1941), Kameran I., Mecca (Lewis, 1945), Amd, Tarim (B.M.).

ABYSSINIA. Harrar (Giaquinto-Mira, 1950).

ERITREA. Archiko, Massawa (Lewis, 1943). Mara (in Jannone *et al.*, 1946) notes that inland the species is represented by the " typical " (dark) form whereas in coastal areas this is replaced by the pale form.

BR. SOMALILAND. Zeila (Edwards, 1941). G. R. C. Van Someren (1943) records both forms and notes the occurrence of intergrading but does not give details of their respective distributions.

KENYA. Mombasa (B.M.).

TANGANYIKA. Dar-es-Salaam (Edwards, 1941).

ZANZIBAR. Unnamed localities (B.M.).

ZULULAND. Ntambanana (B.M.).

NATAL. Durban (B.M.).

SEYCHELLES. Unnamed localities (Theobald, 1911), Porte Victoria (B.M.). Harper (1947) particularly notes the absence of *aegypti* from all localities other than Porte Victoria, which he visited.

MAURITIUS. Port Louis (B.M.).

ALDABARA. Picard I. (B.M.).

Details of localities not already listed are given below :

Locality	Altitude	Latitude	Longitude	Rainfall
Amd, Eastern Aden Prot.	3,100	15.30 N.	48.10 E.	? (10)
Aqiq, Sudan	<500	18.14 N.	38.11 E.	5
Archiko, Eritrea	<500	(15.32 N.)	(39.25 E.)	(10)
Degema, Nigeria	<500	4.45 N.	6.48 E.	(90)
Dongonab, Sudan	<500	21.06 N.	37.05 E.	<5
Gebeit, Sudan	2,500	18.57 N.	36.51 E.	5
Halaib, Sudan	<500	22.12 N.	36.36 E.	<5
Kameran I., Arabia	<500	15.25 N.	42.35 E.	(5)
Massawa, Eritrea	<500	15.37 N.	39.29 E.	5
Mecca, Arabia	2,000	21.25 N.	39.54 E.	(5)
Mohammed Gul, Sudan	<500	(20.45 N.)	(37.00 E.)	<5
Picard I., Aldabara	<500	(9.21 S.)	(46.05 E.)	? (90)
Port Louis, Mauritius	<500	20.18 S.	57.31 E.	(35)
Port Sudan, Sudan	<500	19.37 N.	37.13 E.	5
Principe I., G. of Guinea	0–3,000	2.00 N.	7.30 E.	100
Sinkat, Sudan	3,000	18.50 N.	36.50 E.	5
Suakin, Sudan	<500	19.07 N.	37.20 E.	5
Tarim, E. Aden Prot.	2,200	16.02 N.	49.00 E.	(25)
Tokar, Sudan	<500	18.25 N.	37.45 E.	5
Zeila, Br. Somaliland	<500	11.20 N.	43.28 E.	(5)

APPENDIX IV

Corrigenda to Part I

The receipt of further material of *Aëdes keniensis* and the publication of a description of the larva of *Aëdes ruwenzori* (Gillett, 1951*b*) and of the adult of *Aëdes vinsoni* (*supra*) necessitate certain alterations to the keys published in the first paper of the series. Further alterations are also required to cover variation in *soleatus* as revealed by Mrs. Van Someren's studies of Kenya Lowland material, but it is not felt that information concerning variation in *calceatus* is as yet sufficient to warrant altering the keys. It should, however, be borne in mind that considerable difficulty may be experienced with atypical specimens of this species, and the possibility of confusion of an occasional aberrant specimen of *soleatus* with *heischi* should also be noted. Alterations to the keys can conveniently be made as follows :

p. 246. First line of couplet 20. For " all round " read " above." For " $\frac{1}{7}$th " read " $\frac{1}{9}$th." Couplet 23 should be rewritten as follows :

23. Anterolateral scutal patches pointed behind and reaching margin of scutum for some distance in front. First mid-tarsal often extensively pale behind. Scale patch on *ppn* very small............*soleatus* Edwards.
Anterolateral patches rounded. First mid-tarsal without posterior extension of pale scaling (may be pale above for up to $\frac{3}{5}$ths). Scale patch on *ppn* extensive.. 24.

p. 247. After couplet 36 insert :

37. All femora with well marked knee-spots. Mid femur largely pale in front *vinsoni* Mattingly.
Femora without knee-spots. Mid-femur with pale scaling restricted to a narrow line on the under surface................*mascarensis* MacGregor.

p. 249. Second half of couplet 20. For " *bambusae, dendrophilus, deboeri* " read " 24." After couplet 23 insert

24. Head seta A with 5–8 branches..............................*ruwenzori*.
This seta with at most 3 branches, usually less *bambusae, deboeri, dendrophilus*.

Corrections to the list of localities on pp. 262–263, suggested to me by persons with local knowledge, are as follows :

Altitude of Erkowit to read 3600 ft. Altitude of Fort Ternan to read 5800 ft. Latitude and longitude of Kayembe-Mukulu to read (9.01 S.) (23.59 E.). Altitude of this locality to read (3300). In the second line of the summary on p. 293 the words " No species " should read " Only one species." Mr. Muspratt informs me that De Meillon and Lavoipierre's record of *simpsoni* from Cape Province should be interpreted as from Hole-in-the-Wall rather than from Mkanduli. The last entry under this species on p. 253 should be amended accordingly.

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A PEST OF COCONUT PALMS IN PORTUGUESE EAST AFRICA

TWO NEW REPRESENTATIVES OF THE GENUS *HYPOTRABALA* (LEPIDOPTERA: LASIOCAMPIDAE) FROM THE BELGIAN CONGO

W. H. T. TAMS

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Pp. 67–75; Pls. 1–2; Text-figures 1–14, 9–16

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A PEST OF COCONUT PALMS IN PORTUGUESE EAST AFRICA

By **W. H. T. TAMS**

IN the spring of 1952 Mr. V. Sleptzow, one of the London representatives of the Sociedade Agrícola do Madal, Quelimane, Africa Oriental Portuguesa, brought me a photograph of larvae, cocoons and moths of a destructive pest that was attacking coconut palms on a plantation at Micaune, Moçambique.

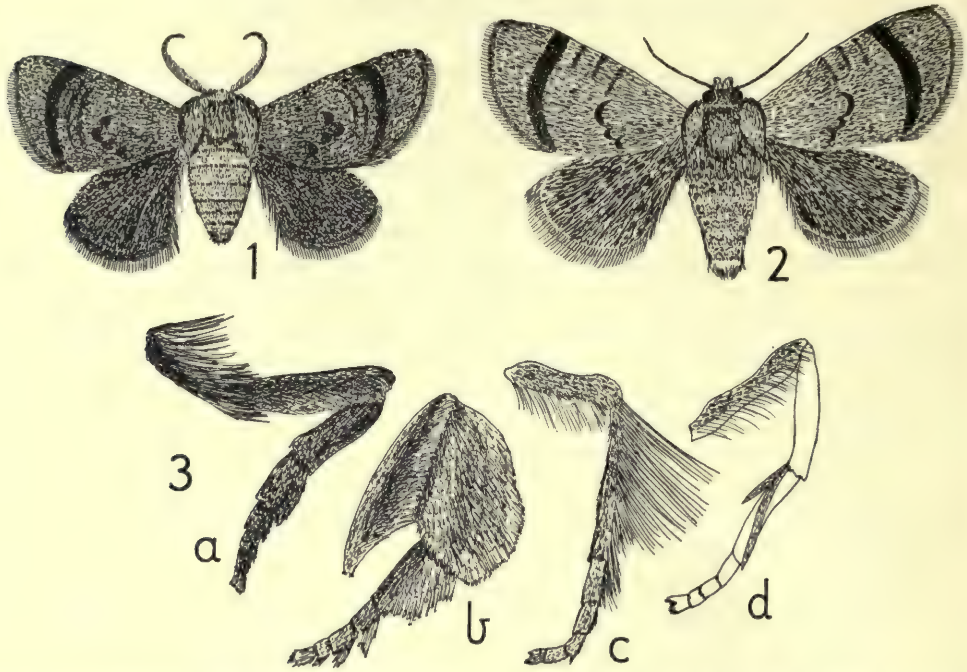
At that time I could do no more than state that the insect involved was a moth belonging to the family Limacodidae, and I asked Mr. Sleptzow if he could procure specimens from the plantation. A consignment was sent by air from Quelimane on 9th June, 1952, but there were no moths, and the small bottles containing larvae had become loose and were smashed, completely ruining the whole consignment, which arrived in a state of putrefaction. The larvae and cocoons were quite unknown to me, and I asked Mr. Sleptzow if he would be good enough to try again. He at once communicated with the African management of the company, with the result that in the middle of September I received by air mail another consignment of larvae and cocoons, and two battered crippled female moths, which had emerged on the journey. I carefully nursed the cocoons at home, and succeeded in rearing a number of moths of both sexes.

After a close study of the species I found that not only was it unknown to me, but I could not find any close relative with which I could associate it generically. Accordingly, I sent several examples to Dr. E. Martin Hering of the Berlin Museum. Dr. Hering, who is the recognized authority on the family Limacodidae, informed me that he fully agreed with me that the species did not belong to any known genus, but appeared to be related to the genera in which the hind tibia bears two spurs only, and the tarsi are clothed with scales rather than with the more delicate hair-scales. It may be related to the *Zinara* group, and has some features suggestive of *Sporetolepis* Karsch, which, however, has at the end of the fore wing cell the fork of the parting-vein deep and closed distally by a cross-vein, whereas in the genus here described the fork is shallow and open.

TROGOCRADA gen. n.

Typus generis *Trogocrada deleter* sp. n.

Antenna in ♂ pectinate, the pectinations decreasing slightly in length distad. Antenna in ♀ simple. Palpus stout, upcurved before frons, 3rd segment small, almost spherical, inconspicuous. Hind tibia with only one pair of spurs; mid tibia with a bushy covering of long scales, all tarsi covered with scales (not fine hair-scales) (fig. 3, *a*, *b*, *c*, *d*). Fore wing with veins Sc, R1 and R2 separate and almost straight; veins R3 + R4 + R5 stalked, medials separate, M2 nearer to M3 than to M1; parting-vein within the cell terminating in an open shallow fork. Hind wing with vein Sc anastomosing with middle of anterior margin of cell; vein Rs stalked with vein M1 for proximal fourth; lower angle of cell not appreciably nearer termen than upper angle. (Figs. 4, 5.)



FIGS. 1–3.—*Trogocrada deleter* sp. n. Fig. 1, male; fig. 2, female; fig. 3, legs (*a*) fore, (*b*) mid, (*c*) hind, to show vestiture, (*d*) hind, to show tibial spurs.

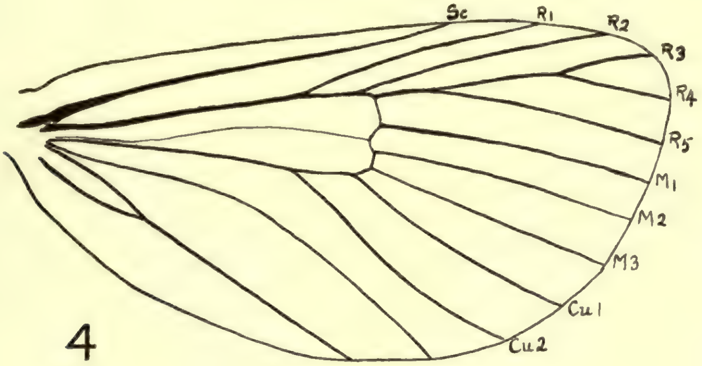
Trogocrada deleter sp. n.

(Figs. 1, ♂, 2 ♀.)

♂. Antenna warm buff, degraded with fuscous. Palpus mainly warm blackish brown, warm buff apically. Frons warm blackish brown, vertex apricot buff. Thorax warm to apricot buff, sometimes degraded with fuscous. Abdomen fuscous, lighter near base. Pectus and legs light to apricot buff, shaded with warm blackish brown in front. Venter fuscous, lighter medially. Fore wing apricot buff, proximal three-fourths heavily over-shaded with fuscous to warm blackish brown, with a wavy appearance between the velvety blackish-brown lunules medially and a strong, velvety, blackish-brown curved postmedial fascia (cf. fig. 1), the distal portion of the wing suffused with tawny. Hind wing fuscous to fuscous black.

Underside of both fore and hind wings fuscous to fuscous black. Expanse: 22–24 mm.

♀. Similar in pattern to ♂; the predominating colour may be apricot buff with tawny to fuscous shading beyond the postmedial fascia on the fore wing, the medial markings and postmedial fascia velvety blackish brown, or the whole wing may be suffused with fuscous. Underside may be apricot buff or fuscous. Expanse: 26–27 mm.



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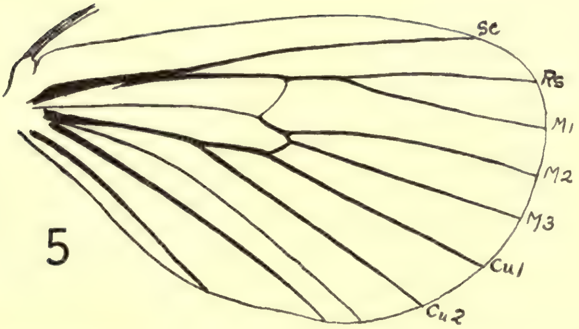

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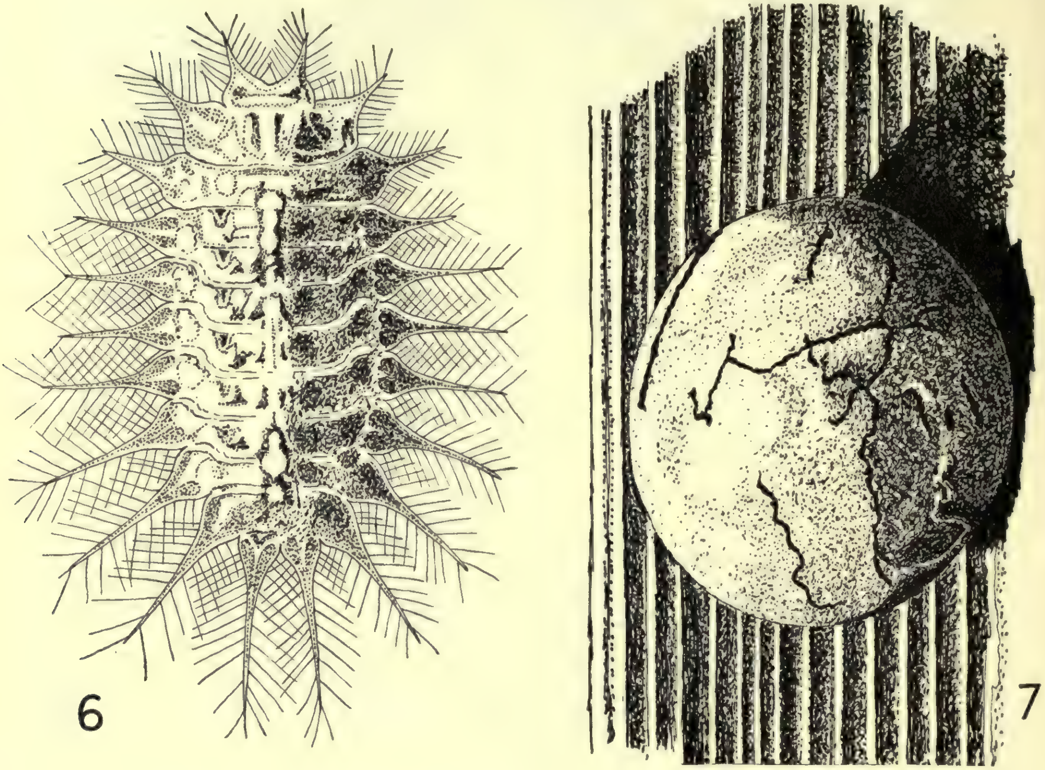
Figs. 4, 5.—*Trogocrada deleter* sp. n. Fig. 4, fore-wing venation; fig. 5, hind-wing venation.

♂ genitalia. The male genitalia exhibit a robust structure of segments IX–X, the division between the terga being difficult to discern. The various structures are better displayed by figures than by descriptions. The valva is most unusual in shape and possesses distally a sort of loose "corona" of woolly hair-scales, and two fairly stout whip-like setae (figs. 8–13).

♀ genitalia. A very lightly sclerotised ostium bursae; ovipositor lobes broad and prominent.

Larva (fig. 6). The larva is green with velvety darker green shading and a variable line down the middle of the dorsum, frequently white edged with reddish, or entirely reddish. In shape it is quite unlike any Limacodid larva known to me.

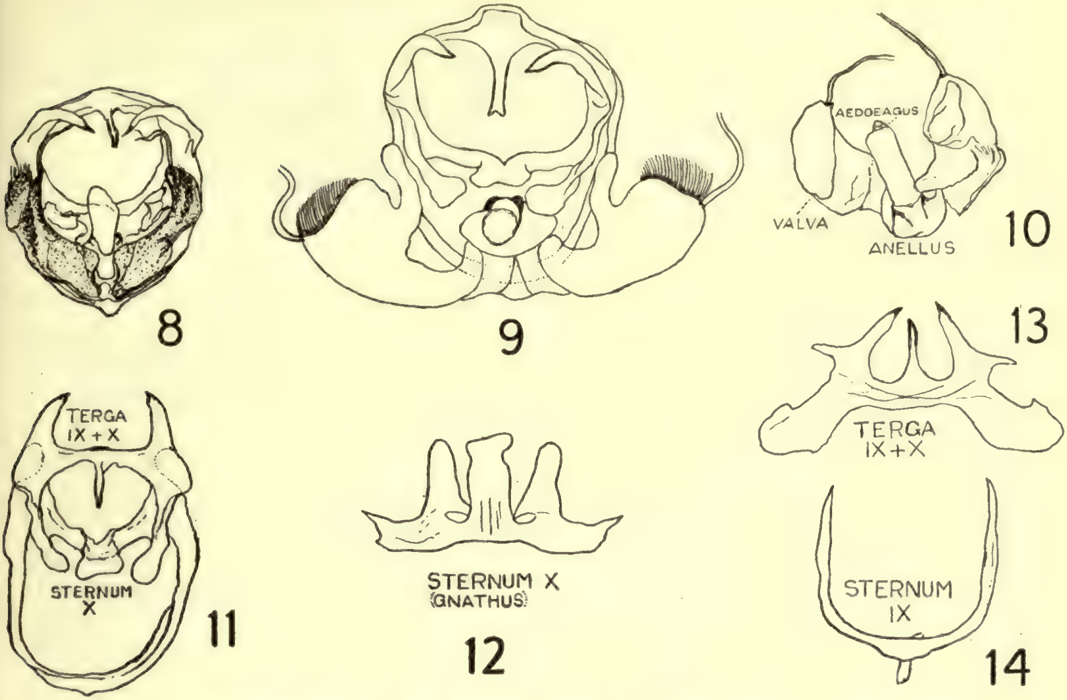
Cocoon (fig. 7). The larva makes an almost spherical cocoon (9 mm. × 8 mm.), whitish with irregular blackish markings.



Figs. 6, 7.—*Trogocrada deleter* sp. n. Fig. 6, larva ; fig. 7, cocoon.

Holotype ♂, allotype ♀ and 8 paratypes:

Portuguese East Africa, Micaune, destroying coconut plantations. Presented by the Sociedade Agrícola do Madal, through Messrs. E. Isen (Quelimane), M. Terestchenko and V. Sleptzow, to whom I am grateful for the opportunity to study such an interesting moth.


8
9
AEDOEAGUS
VALVA
ANELLUS
10
13
TERGA IX + X
STERNUM X
11
STERNUM X (GNATHUS)
12
TERGA IX+X
STERNUM IX
14

FIGS. 8–14.—*Trogocrada deleter* sp. n., ♂ genitalia. Fig. 8, complete armature, valvae (shaded) unspread; fig. 9, complete armature, valvae spread; fig. 10, valvae, anellus and aedoeagus separated from segments IX–X; fig. 11, segments IX–X; fig. 12, sternum X (gnathus); fig. 13, terga IX–X (tegumen and uncus); fig. 14, sternum IX (vinculum).

TWO NEW REPRESENTATIVES OF THE GENUS *HYPOTRABALA* (LEPIDOPTERA: LASIOCAMPIDAE) FROM THE BELGIAN CONGO

By W. H. T. TAMS

In 1925 I drew attention (*Ann. Mag. Nat. Hist.* (9) **16**: 552–561) to the fact that certain species of African Lasiocampidae were not associated in their proper genera, and I dealt particularly with the genera *Pseudometa* Aurivillius and *Hypotrabala* Holland. I have since discovered that *Pseudometa schultzei* Aurivillius is not a *Pseudometa* but belongs in the genus *Mallocampa* Aurivillius.

Some time ago Monsieur L. A. Berger of the Congo Museum at Tervuren, Belgium, brought me two further examples of the genus *Hypotrabala*, and these are described below. I have given in this paper a few figures of the eighth sternum in various species of this genus, as this structure may be readily observed if the scales are carefully removed from the underside of the terminal abdominal segments, and it is an important aid to identification.

Hypotrabala regalis sp. n.

(Pl. 1, figs. 3, ♂, 4, ♀; Pl. 2, figs. 5, 6.)

♂. Antenna honey yellow, the shaft with some chocolate scales. Head, palpus, thorax, abdomen and legs light orange yellow, with some chocolate shading. Fore wing pale orange yellow enriched with light orange yellow, the dark pattern indicated in the photograph chocolate. At the end of the cell a large glossy white oval spot, finely edged with chocolate, with a much smaller spot of like appearance between it and the costa, from which it is slightly more distant. Hind wing pale orange yellow without pattern. Underside pale orange yellow. Expanse 82 mm. (77 mm. from tip-to-tip).

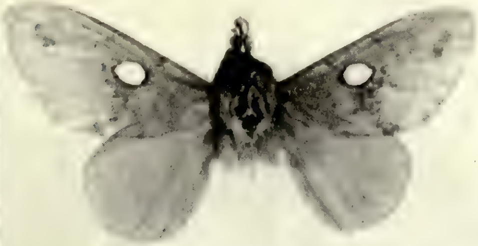
♀. Similar, much larger, richer in colour (light orange yellow), with some fuscous shading in the subterminal markings; a single smaller discocellular spot, chocolate with or without a few white scales centrally.

Expanse 114 mm. (104 mm. from tip-to-tip).

Belgian Congo, Lulua, Kapanga (F. G. Overlaet).

Holotype ♂: 18.xii.1933, 4 ♂ paratypes dated 13.ix.1932, x.1933 and xi.1933 (2) respectively. Allotype ♀: 8.xii.1932, 2 ♀ paratypes dated 12, 14.xii.1932, respectively.

The ♂ genitalia are unlike those of the other *Hypotrabala* species known to me in having a single medial process on sternum VIII (Pl. 2, fig. 5). The ♀ genitalia are shown in Pl. 2, fig. 6; they are strongly sclerotized, with a robust bar before the ostium.



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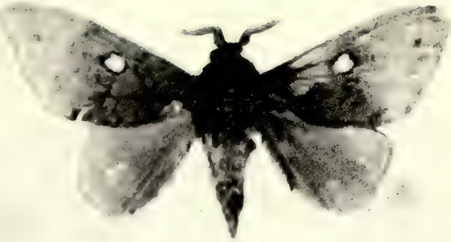

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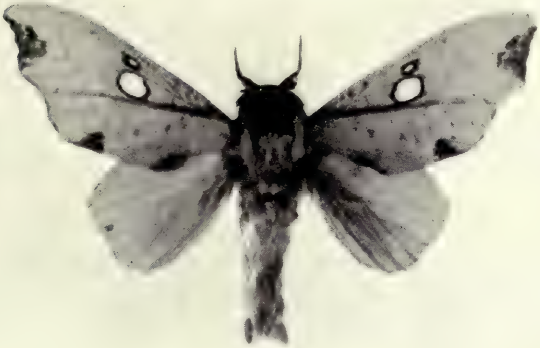

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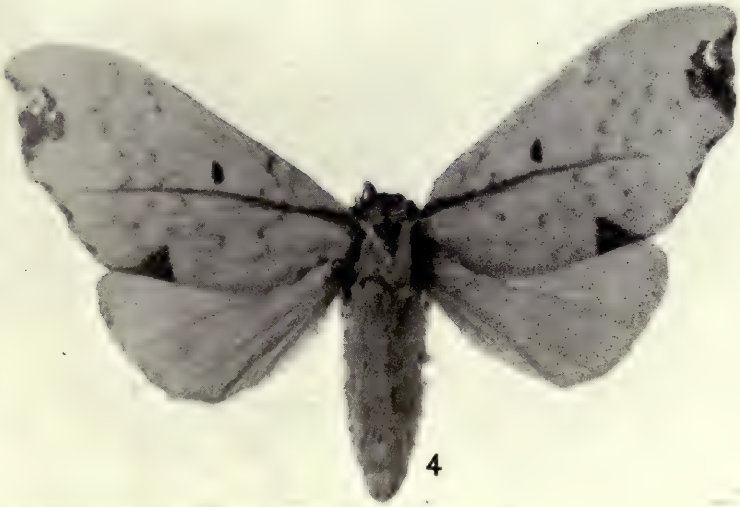

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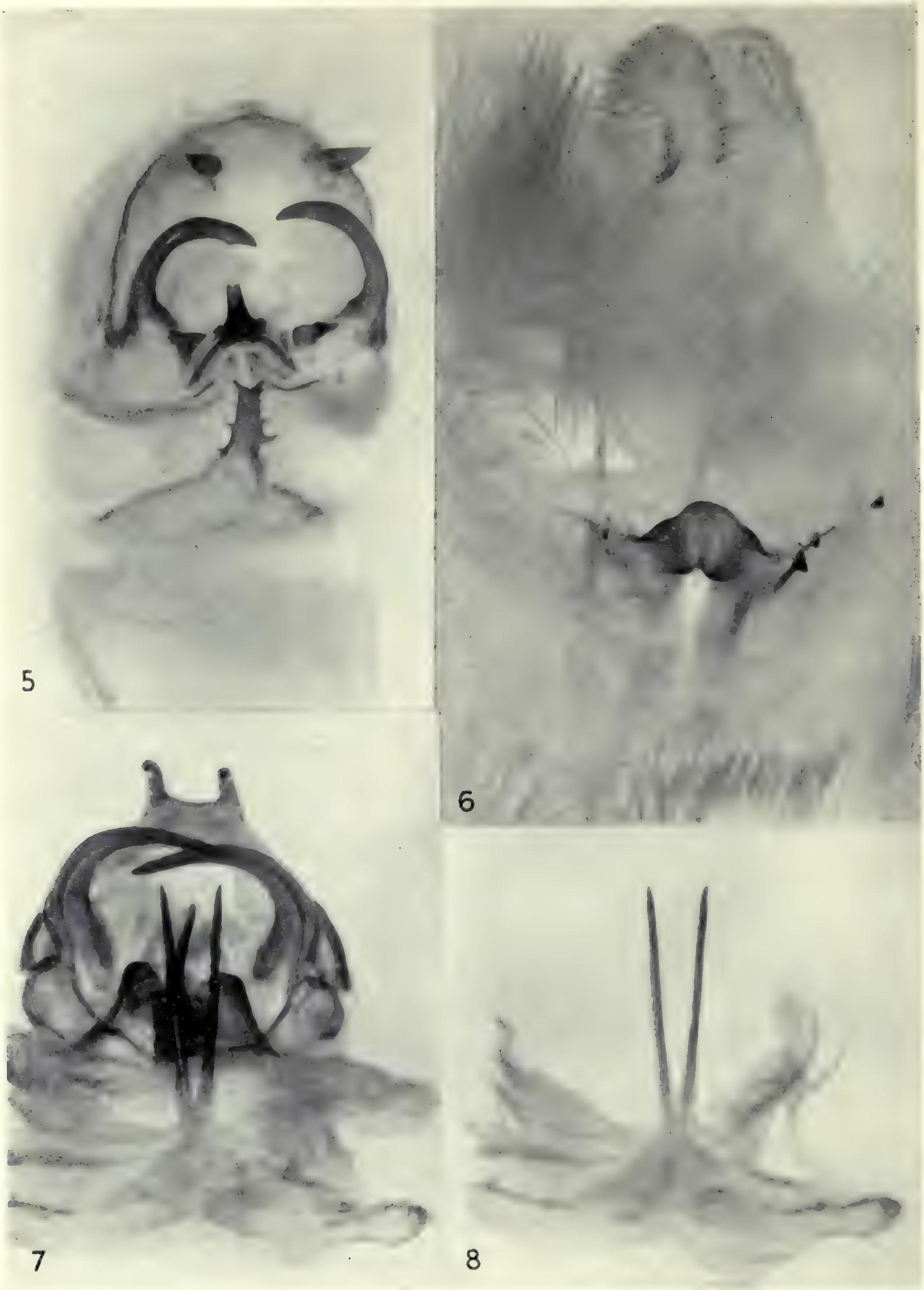
HYPOTRABALA.



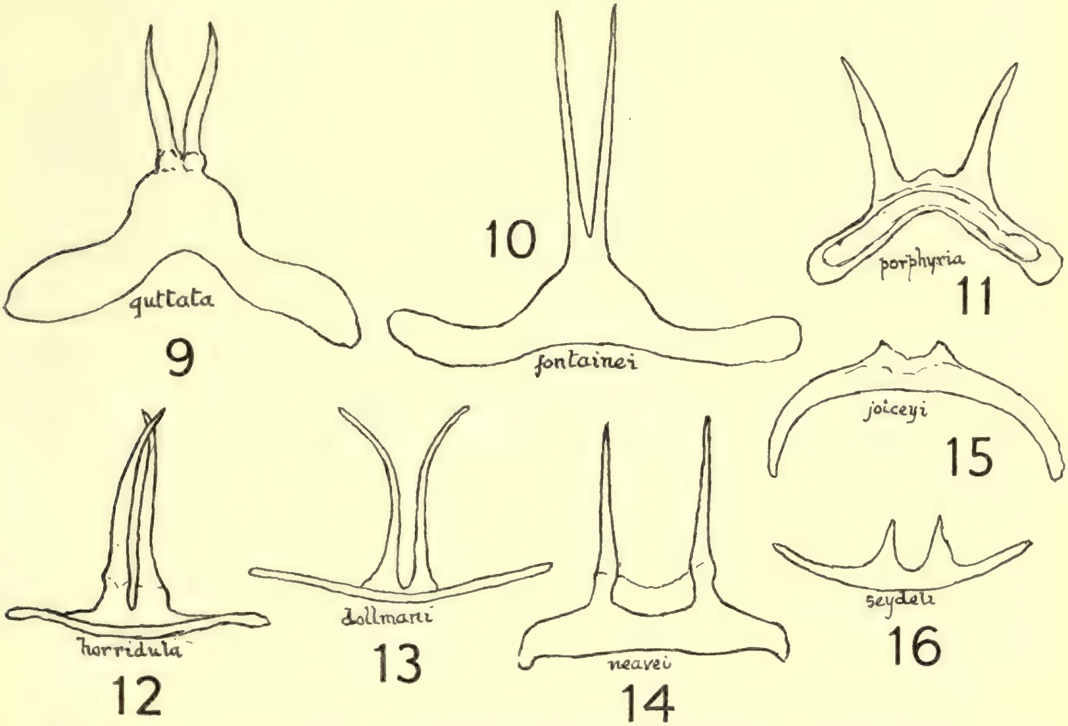
Hypotrabala.
Genitalia.

Hypotrabala guttata fontainei ssp. n.

(Pl. 1, fig. 1, ♂; Pl. 2, figs. 7, 8.)

♂. Slightly larger than *H. guttata guttata* Aurivillius (Pl. 1, fig. 2), with a larger discal glossy white spot. ♂ genitalia (Pl. 2, figs. 7, 8, text-fig. 10) with sternum VIII bearing two long straight processes, the shape of the sternum being quite different from that of *H. guttata guttata* (text-fig. 9), which came from the Gold Coast. Expanse 70 mm. (66 mm. from tip-to-tip).

Holotype ♂: Belgian Congo, Lusambo, 13.x.1949 (Dr. M. Fontaine).



Figs. 9–16.—♂ VIIIth sternum in the genus *Hypotrabala*. 9. *Hypotrabala guttata guttata*. 10. *H. guttata fontainei*. 11. *H. porphyria*. 12. *H. horridula*. 13. *H. dollmani*. 14. *H. neavei*. 15. *H. joiceyi*. 16. *H. horridula seydeli*.

EXPLANATION OF PLATES AND FIGURES

Pl. I, Figs. 1–4.—*Hypotrabala guttata fontainei* ♂ (fig. 1), *H. g. guttata* ♂ (fig. 2); *Hypotrabala regalis* ♂ (fig. 3), ♀ (fig. 4).

Pl. II, Figs. 5–8.—*Hypotrabala regalis* ♂ genitalia (fig. 5), and ♀ (fig. 6); *H. guttata fontainei* ♂ genitalia (fig. 7), ♂ sternum VIII (fig. 8).

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H. STEMPFFER AND N. H. BENNETT

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Pp. 77–104; *Pls.* 3–9;

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By H. STEMPFFER AND N. H. BENNETT

SYNOPSIS

Teriomima, a small genus of African butterflies, of the family Lycaenidae, is distributed throughout the E. and S.E. regions. Little attention has been paid to them since 1918, when Aurivillius, in Seitz: *The Macrolepidoptera of the World*, **13** : 327–328, dealt with the few species then recognized. An exhaustive study of the male genitalic structure has led the authors to describe two additional genera, eight new species and one new subspecies, all contained within the earlier conception of the genus.

I. HISTORY OF THE GENUS

THE Liptenine genus *Teriomima* was described by Kirby in 1887 (*Ann. Mag. Nat. Hist.* (15) **19** : 364–367). In it he placed *Pieris erastus* Hewitson (1866) and the following seven new species which he described at the same time, namely *Teriomima subpunctata* (the type species), *T. puella, T. tenera, T. similis, T. erasmus, T. flaveola, T. dispar* and *T. hildegarda*. In 1888 H. H. Druce described and added *Teriomima melissa* (*Ent. Mon. Mag.* **25** : 109). In 1890 Kirby (*Ann. Mag. Nat. Hist.* (6) **6** : 268–271) added a further six new species, *T. decipiens, T. delicatula, T. serena, T. modesta, T. cordelia* and *T. dubia*, and transferred Hewitson's *Liptena adelgitha* (1874) to the genus. In the same year W. J. Holland (*Psyche*, **5** : 429) added *Teriomima leucostola, T. xanthostola* and *T. xanthis*. Two years later Staudinger (*Iris, D. ent. Zeit.* **4** : 219–220) added *Teriomima adelgunda* and *T. alberta*, both new, and in 1894 Smith and Kirby (*Rhop. Ex.* **2** : 115, Afr. Lyc., pl. 25, figs. 1 and 2) added *T. freya*. In 1895 *T. galenides* Holland (*Ent. News Philad.* **6** : 167) appeared. In 1898 Grose Smith (*Novit. Zool.* **5** : 355) extended the list with *T. pusio* and *T. fuscula*.

Aurivillius, in *Rhopalocera Aethiopica* (1898), included in *Teriomima* the following species: *T. subpunctata* Kirby, *T. delicatula* Kirby, *T. puella* Kirby, *Durbania puellaris* Trimen (*Proc. Zool. Soc. Lond.* **1894** : 59–60), *T. hildegarda* Kirby with var. *freya* Smith & Kirby, *Liptena aslauga* Trimen (*Trans. Ent. Soc.* **1873** : 117), *Durbania pallida* Trimen (*Trans. Ent. Soc.* **1898** : 12) and *Durbania micra* Grose Smith (*Novit. Zool.* **5** (1898) : 356). He excluded from the genus *Pieris erastus* Hewitson, *T. tenera* Kirby, *T. pusio* Kirby, *T. similis* Kirby and *T. serena* Kirby, attributing them to the genus *Citrinophila* on neuration. *T. erasmus* Kirby and *T. flaveola* Kirby he treated as synonyms of *P. erastus* Hewitson.

T. xantha was described by Grose Smith in 1901 (*Rhop. Ex.* **3** : 140, Afr. Lyc., pl. 29, figs. 13, 15).

In Seitz (*Macrolep.* **13** : 327–328, 1918), Aurivillius listed the following as *Teriomima* species: *T. subpunctata* Kirby, *T. delicatula* Kirby, *T. puella* Kirby, *T.*

puellaris Trimen, *T. micra* Grose Smith, *T. aslauga* Trimen, and treated *hildegarda* Kirby and *pallida* Trimen as forms of *aslauga* owing to the great variability of their wing patterns. Hawker Smith described *T. parva*, *T. minima* and *T. minima latimarginata* in 1933 (*Stylops*, **2** : 6–7) ; Talbot added *T. minima* f. *stygia* in 1935 (*Ent. Mon. Mag.* **71** : 72) ; Riley described *T. woodi* in 1943 (*Entomologist*, **76** : 225–226) ; van Son described *T. zuluana* in 1949 (*Ann. Transv. Mus.* **21**(2) : 211), placing this species closest to *T. puellaris* Trimen.

This appears to be the history of the genus to date. Of the thirty-seven names cited seven have been absorbed into *Citrinophila*, viz., *tenera*, *similis*, *erasmus*, *erastus*, *flaveola*, *serena* and *pusio* ; seven are now placed in *Liptena*, viz., *decipiens*, *modesta*, *leucostola*, *xanthostola*, *xantha*, *xanthis* and *galenides* ; four in *Epitolina*, viz., *melissa*, *dispar*, *cordelia* and *dubia* ; four are now in *Micropentila*, viz., *adelgitha*, *adelgunda*, *alberta* and *fuscula*.

2. METHOD OF REVISION

The dissection of a number of specimens labelled " *aslauga* " revealed that several species were involved. Late in 1949 each of the authors commenced, by arrangement, an independent survey of the genitalic forms within the genus. Each having access to a different source of material, and employing varying techniques, it was hoped that the possibility of errors of interpretation might thereby be greatly reduced. When the two sets of results were correlated an encouraging degree of unanimity was at once apparent. Where divergences occurred they were usually due to a shortage of material, always the main obstacle to this kind of investigation. An extensive exchange of specimens, genitalic preparations, etc., soon confirmed the mutual realization that there were differences of structure of sufficient diversity and stability to warrant regrouping into three genera, two of which are new, as indicated below :

1. TERIOMIMA Kirby, to include *subpunctata*, *puella*, etc.
2. BALIOCHILA genus nov., to include *aslauga*, *hildegarda*, etc.
3. CNODONTES genus nov. to include *pallida*, etc.

At an early stage both workers agreed that it is impossible, except in a few instances, to make reliable specific determinations from external appearances. This difficulty is well illustrated by the fact that Aurivillius, for all his experience, placed the bulk of our species of *Baliochila* and *Cnodontes* under a single specific name in Seitz, wherein *hildegarda* and *pallida* are treated as subspecies or seasonal forms of *aslauga*. Even when long series have been positively identified by dissection, such is the intergradation of wing pattern and coloration, especially in *Baliochila*, that it would still be hazardous to name most specimens without examining the genitalia, even with the rich material (eleven hundred specimens) available for comparison in the British Museum. The descriptions given later in this work might suggest a great diversity of form, but what frequently occurs is no more than a confusing reversal of ground-colour and pattern. In plate 9 an attempt is made to illustrate the extremes of variation within the species *B. hildegarda* and *B. dubiosa*.

Also shown are examples of *B. neavei* and *C. vansomereni*, which differ greatly in appearance from the selected type-specimens.

From the foregoing it will be appreciated that the formulation of a key based on external appearances would be a waste of time. A key to the genitalia could be readily produced, but it is considered that the complete set of illustrations of these organs which accompanies this work is so self-explanatory as to render a key superfluous.

The effectiveness of this revision was greatly enhanced by Professor Varley, of the Hope Department of Entomology, University Museum, Oxford, who, through the kind offices of Professor Hale Carpenter, lent the whole of the Hope Department collection of *Teriomima*, amounting to more than three hundred and fifty specimens, to facilitate this undertaking. We are indebted to Dr. V. G. L. van Someren for a similar act of co-operation. Our thanks are also due to T. H. E. Jackson, Esq., for numerous contributions of material, as well as for his " on-the-spot " knowledge of the genus, so readily placed at our disposal; to E. B. D. Barnes, Esq., of Umtali, who provided examples of the new species *B. barnesi* and *B. lipara*, and to Dr. van Son, who furnished some examples of *B. aslauga*. We are also indebted to W. H. T. Tams, Esq., for much sound advice on genitalic problems.

3. SYSTEMATIC ACCOUNT OF THE GENERA AND SPECIES

Genus ***TERIOMIMA*** Kirby (sensu stricto).

Kirby: *Ann. Mag. Nat. Hist.* (5) **19** : 364 (1887).

Type of the genus: *Teriomima subpunctata* Kirby (1887) designated by Kirby. *Eyes* bare; *palpi* rather long, ascending, projecting beyond the frons, clothed with adpressed scales, the second joint stout, laterally compressed, the third joint slender, acuminate; *antennae* rather short, with a distinct, subcylindrical club; *male forelegs* with unsegmented tarsi, clothed beneath with fine spines. *Wing shape. Fore wings:* costa evenly arched, rather rounded apex, outer margin strongly convex. *Hind wings:* oval, anal angle not very distinct. *Neuration: Fore wing* with twelve veins; cell short; vein 4 from the lower angle of the cell; posterior discocellular concave; vein 5 nearer to 6 than to 4; 6 and 7 arising from a common stalk from the upper angle of the cell; 8 and 9 branching from 7; 10 and 11 free, from the upper edge of the cell, 10 arising very close to the upper angle. *Hind wing:* cell rather short; 3 arising a little before the lower angle of the cell; 4 from the angle; posterior discocellular concave; 5 nearer to 6 than to 4; 6 from the upper angle of the cell; 7 from just before the upper angle.

MALE GENITALIA: GENERAL DESCRIPTION. Uncus bifid, consisting of two more or less pointed finger-like processes; no subunci; tegumen fairly wide; vinculum of moderate width; anellus fused to the bases of the valvae, forming a narrow sheath to the base of the aedoeagus; valva oblong, with a pointed, more or less falcate apex, sometimes having a curved, finely pointed harpe extending over the distal third of its length; aedoeagus fairly stout, the distal end having one or two ventrally-directed lobes which may be long and curved, as in the *subpunctata*-group, or rather short and blunt, as in the *micra*-group.

(1) ***Teriomima subpunctata*** Kirby (1887)

(Pl. 3, fig. 1, neallotype ♂; Pl. 5, fig. 26, ♂ genitalia)

Teriomima subpunctata Kirby, 1887, *Ann. Mag. Nat. Hist.* (5) **19** : 364, W. Africa (?).
syn. *Teriomima delicatula* Kirby, 1890, *Ann. Mag. Nat. Hist.* (6) **6** : 269, Usagara.

(NOTE. The treatment of *delicatula* as a synonym is the result of a careful examination of over 150 specimens; it is impossible to find any constant points of differentiation in facies or genitalia.)

Holotype (♀) in the British Museum (N.H.). ♂ not previously described.

♂. Frons brown with two lateral fine white lines; second joint of the palpi laterally compressed, clothed with white scales at the centre, brown at the extremities, third joint white tipped; antennae black, ringed with white, club black with reddish-brown tip; tarsi black, ringed with white.

UPPERSIDE FORE WING. White, with a costal margin of light brown scales extending one-third from the base, a minute patch of the same colour between the extremities of veins 11 and 12; a triangular apical patch, rather darker, from the extremity of 10 on the costal margin to midway between 2 and 3 on the outer margin.

UPPERSIDE HIND WING. White, with a very small patch of light brown scales at the tip of each vein.

UNDERSIDE FORE WING. Ground-colour white, yellowish at the costal margin and in the apical area; lightly patterned with small patches of mixed pale and dark brown scales arranged as follows: five evenly spaced patches from the base to midway along the costal margin; three evenly spaced patches from the base of the cell to the discocellulars; a straight row of three patches disposed between veins 9 and 10, 6 and 5 and 5 and 4; a curved row of five spots corresponding to the inner edge of the apical patch on the upperside, the lowermost between veins 3 and 4; two rows, marginal and submarginal, of very small spots from the apex to vein 3.

UNDERSIDE HIND WING. Ground-colour white, with a rather more evenly distributed pattern of light and dark brown patches than on the fore wing; although very irregular, these patches may be placed in six rows, the fourth from the base being the most heavily marked.

Fringes of both wings white except at the apex of the fore wing, where they are brown with interruptions of white.

LENGTH OF FORE WING. 15·6 mm.

♂ GENITALIA. Uncus bifid, lobes dilated at the base and tapering to blunt points, tips ventrally inclined, sparsely hairy; no subunci; tegumen fairly large; vinculum of moderate width; anellus sheathing the base of the aedoeagus, which is long and robust, curved in the form of a flattened S and bearing, near the distal end, two ventrally directed lobes or flaps, the distal end blunt; valva flask-shaped, with a long, curved harpe, apex weakly falcate.

Neallotype ♂: Brit. E. Afr., Uchweni Forest, 1–2.iii.1912 (S. A. Neave), in the British Museum (N. H.) B.M. Type No. Rh. 15684.

DISTRIBUTION. Kenya, Tanganyika.

(2) ***Teriomima puella*** Kirby (1887)

(Pl. 3, fig. 2, neallotype ♀; Pl. 5, fig. 27, ♂ genitalia)

Teriomima puella Kirby, 1887, *Ann. Mag. Nat. Hist.* (5) **19** : 365, W. Africa.

Holotype (♂) in the British Museum (N.H.). ♀ not previously described.

♀. External characters as in the male. A long series from Nyasaland, Mlanje, show considerable variation of the costal markings of the upperside fore wing and in the spotting of the underside hind wing.

Length of fore wing : 17 mm.

♂ GENITALIA. Very similar to those of *subpunctata*, but with narrower valvae, having shorter and more sharply curved harpes.

Neallotype ♀: Nyasaland, Mlanje, 2200′, 8.xi.13 (S. A. Neave), in the British Museum (N.H.). B.M. Type No. Rh. 15685.

DISTRIBUTION. Nyasaland, N.E. Rhodesia, Tanganyika Territory.

(3) ***Teriomima zuluana*** van Son (1949)

(Pl. 5, fig. 28, ♂ genitalia)

Teriomima zuluana van Son, 1949, *Ann. Transv. Mus.* **21** (2) : 211, pl. 3, figs. 5–8, text-fig. 1, Hluhluwe, Zululand.

Types in the Transvaal Museum.

For convenience the author's descriptions are given below. A male and a female of this species have been made available for study by the courtesy of Mr. Pennington.

"♂. Head : frons black, eyes edged with ochraceous white ; palpi black, third joint white at tip ; antennae black, shaft chequered with white, club black above, below with seven terminal joints reddish-brown. Thorax : black, clothed with antimony yellow (Ridgway, pl. XV) scales and hairs above, and scales only of the same colour below ; legs black, chequered with white, and with some antimony yellow chequering on coxae and femora. Wings : antimony yellow above and below. Upperside : fore wing, costa blackened from the base to less than one-third the length of the cell, closely followed by a bar opposite the middle of the cell, another opposite two-thirds of the cell, and a third at the middle of the costa (absent in most specimens) ; apical area with the inner edge very oblique (almost parallel with the inner margin) to vein M_1, narrowed below the vein and reaching the middle of area Cu_1. Hind wing unmarked. Underside : fore wing : seven equidistant small bar-like black dots, the first being placed a little before the level of the middle of the cell and the third, very minute, a little before the level of the end of the cell ; under magnification most of these dots appear to consist of separate minute bars which are often unequally developed on the right and left side ; an interrupted oblique bar from the sixth costal dot to vein M_1, (absent in many paratypes) ; a black marginal line, thickened at the apex, interrupted between the veins and not reaching below vein Cu_2, where it is very indistinct. Hind wing : a black dot at the middle of area RS ; postdiscal black dots in areas M_1, Cu_1, Cu_2 ; there is no postdiscal dot in area A_2 ; a rather diffuse discocellular dot tinged with orange, and a dot before middle of cell; a black interrupted marginal line from vein Cu_2 to anal angle (in many paratypes the dots of the underside of the hind wing are reduced or absent, and are best marked in January specimens). Length of fore wing: 14·6 mm. Antenna-wing ratio: 0·42.

Description of the female allotype.

Larger than the male, antennal club, with a few greyish scales below, and without any reddish brown. Fore wing: black apical area a little larger than in the male and projecting inwards along vein M_1; otherwise like male.

Length of fore wing. 16 mm. Antenna-wing ratio: 0·42.

♂ GENITALIA. Uncus double, with the prongs bent down at an obtuse angle at the middle. Valve: very elongate, gradually widened from the narrow base to two-thirds of its length, then rather abruptly narrowed and produced distally into an acute, slightly down-curved spine; ventral rim with a long claw-like process arising midway from base to apex and directed distad, with the tip slightly down-curved and reaching beyond the base of the apical spine; its length is half the length of the valve. Aedoeagus: half as long as the valve, stout, apically rounded, with two elongate triangular prongs directed downwards and which are shorter than the width of the aedoeagus; vesica forming two elongate sacs."

DISTRIBUTION. Zululand.

(4) ***Teriomima puellaris*** Trimen (1894)

(Pl. 5, fig. 29, ♂ genitalia)

Durbania puellaris Trimen, 1894, *Proc. Zool. Soc.* **1894**: 59, pl. 6, fig. 14, ♀, Manica, Vunduzi R.

Types not examined. Presumably in the South African Museum, Cape Town.

♂ GENITALIA. Of the *subpunctata*-type, but with uncus lobes more slender; harpes shorter; aedoeagus with very distinctive ventral lobes, long, sinuate and tapering, distal end of aedoeagus forming a small point.

DISTRIBUTION. Mashonaland.

(5) ***Teriomima micra*** Grose Smith (1898)

(Pl. 6, fig. 30, ♂ genitalia)

Durbania micra Grose Smith, 1898, *Novit. Zool.* **5**: 356, B.E.A., Tana River (Dr. Ansorge).

Types in the British Museum (N.H.).

(NOTE. The author described the male as the female and vice versa.)

♂ GENITALIA. Uncus lobes straighter than in the *subpunctata*-type armatures, more slender and sharply pointed; no subunci; tegumen quite long; vinculum and anellus as in the preceding species; aedoeagus terminating in a sharp point which arises from a zone thickly clad with fine hairs, ventral face deeply excised near the distal end, then broadening to a blunt, ventrally directed lobe; valva without harpe, apex strongly falcate, with a pronounced angle on the ventral margin; uncus and distal half of valvae hairy.

DISTRIBUTION. Kenya, coast region.

(6) ***Teriomima parva*** Hawker Smith (1933)

(Pl. 3, fig. 3, neallotype ♀; Pl. 6, fig. 31 ♂ genitalia)

Teriomima parva Hawker Smith, ♂ (nec ♀ = *minima minima*), 1933, *Stylops*, **2**: 6, 14 m. N.W. of Mombasa, Rabai, 23.i.1904 (K. St. A. Rogers).

Holotype (♂) in the British Museum (N.H.); ♀ not previously described.

♀. UPPERSIDE fore wing and hind wing somewhat paler than in the male; forewing costal markings reduced to three pale brown spots and a very short subapical band; apical dark brown band extending to the tornus, but little more than half as wide as in the male; hind wing as in the male, apart from the slightly paler ground colour. Underside fore wing and hind wing as in the male.

Length of fore wing: ♀, 12 mm.

♀ Neallotype: 14 m. N.W. of Mombasa, Rabai, 13.vi.03 (K. St. A. Rogers), in the British Museum (N.H.), B.M. Type No. Rh. 15686.

♂ GENITALIA. Differ only very slightly from those of *micra*. The valvae are less strongly falcate and there is no marked angle on the ventral edge to break the smooth inward curve of the apex.

DISTRIBUTION. Kenya; Port. E. Afr.; Moa, Tanganyika Territory.

Genus ***BALIOCHILA*** gen. nov.

Type of the genus: *Liptena aslauga* Trimen, 1873.

Eyes, *palpi*, *antennae*, *legs*, *wing-shape* and *neuration* as in *Teriomima*. The generic name was suggested by the spotted costa found in these species.

♂ GENITALIA: GENERAL DESCRIPTION. All but one of the species included in this genus share a common character, this being so distinctive that, in the authors' estimation, other quite considerable divergences may be disregarded; a pair of processes, the base of each being strongly attached to the dorsal side of the anellus on its inner margin and less strongly, with a half-membranous lesion to the tegumen, on its outer margin. The processes rest more or less parallel with the axis of the abdomen, midway between uncus and aedoeagus; they are usually crowned with strong spines, but in some species are completely covered with short, stiff bristles. It is difficult to decide the exact homology of these processes; they cannot be classed as subunci as they are not articulated at the level of the uncus-tegumen suture, nor can they be termed anellus lobes since they are also fused to the tegumen; the noncommital term " special processes " will therefore be used in the ensuing specific descriptions. It is possible that they correspond with the asymmetrical processes found in *Ornipholidotos*, which are articulated to the vinculum at a point approximating to the suture of the tergite and sternite.

Four groups of species are readily separated within the genus by the formation of the uncus and the shape of the special processes:

(*a*) Uncus bifid, the two arms widely separated, more or less slender; special processes rather short; *aslauga* Trimen, *barnesi* sp. nov., *neavei* sp. nov., *hildegarda* Kirby, *dubiosa* sp. nov., *nyasae* sp. nov., *stygia* Talbot.

(*b*) Uncus a long flattened stalk, excised at the apex ; special processes long and slender ; *woodi* Riley, *fragilis* sp. nov.

(*c*) Uncus forked, the arms slender and tapering, curved in both lateral and ventral planes ; special processes long and robust ; *minima* Hawker Smith, *lipara* sp. nov.

(*d*) Uncus forked, the arms mounted on a long central stalk ; no special processes, but a pair of long, slender anellus lobes are found in their place ; *singularis* sp. nov.

Other parts of the genitalia are similar to those of *Teriomima* ; the aedoeagus, however, never has the distinctive ventral expansions found in the *subpunctata*-group.

(7) ***Baliochila aslauga*** Trimen (1873)

(Pl. 6, fig. 32, ♂ genitalia)

Liptena aslauga Trimen, 1873, *Trans. Ent. Soc.* **1873** : 117, Natal, Pinetown, near Durban.

Type not examined. Stated by Trimen to be in the collection of W. Morant, Esq.

♂ GENITALIA. Uncus formed of two short, spiny arms, at the base of each a small, acute triangular apophysis ; no subunci ; tegumen wide ; special processes short and crowned with spines ; vinculum broad, anellus sheathing the lower part of the aedoeagus ; valva flask-shaped with a falcate pointed apex ; aedoeagus long, slightly excised on the ventral face, near the distal end.

DISTRIBUTION. S. Africa, Natal, Delagoa Bay, etc., in the British Museum (N.H.), Zululand, Hluhluwe, in coll. Stempffer. False Bay, in coll. Jackson.

(8) ***Baliochila barnesi*** sp. nov.

(Pl. 3, fig. 4, holotype ♂ ; fig. 5, allotype ♀ ; Pl. 6, fig. 33, ♂ genitalia)

Types in the British Museum (N.H.).

♂. Frons grey or blackish-grey with two lateral fine white lines ; second joint of the palpi laterally compressed, clothed with fuscous scales, with a scattering of white on the underside, third joint white-tipped ; antennae fuscous, ringed white, club fuscous, orange-tipped ; legs fuscous, ringed white.

UPPERSIDE FORE WING. Orange-yellow with dark brown markings ; costal border extending about two-thirds from the base, with two clearly-marked dots of the ground-colour between costa and margin ; occasionally an additional one or two less clearly-marked dots may be present ; some fuscous scales in the cell ; one fuscous bar from the costal border covering the discocellulars ; another, larger curved bar from the costal border to vein 3 ; apex broadly fuscous and extending as a tapering marginal band to the tornus, the inner edge of this band rather irregular.

UPPERSIDE HIND WING. Coloration as in the fore wing ; the dark crescentic marginal border extending from the apex to the anal angle, about 2 mm. wide at its centre ; inner edge irregular.

Fringes fuscous, with white patches between veins 5–6–7 of the fore wing; irregular white patches from the apex to the anal angle of the hind wing.

UNDERSIDE FORE WING. Ground-colour less orange than on the upperside and shading to pale yellow towards the inner margin; all markings of the same tint as the hind wing ground-colour; costal border with four evenly spaced yellow dots between the costa and the margin; from the costal border run four bars, one crossing the cell near its base, a second crossing the cell about midway, a third covering the discocellulars, the fourth and largest curving from the margin to vein 3; apical pattern consisting of a triangular patch based on the costal margin curving outward and terminating at vein 4; outside this an antemarginal band, crenulate and tapering from the costa to vein 2; a marginal line tapering from the apex to vein 2.

UNDERSIDE HIND WING. Ground colour dark violet-grey with a boldly marked pattern consisting of numerous orange spots disposed in five irregular bands, in certain examples the third band accentuated by a heavy fuscous outline to the outer side of each spot; between the veins a submarginal series of triangular orange markings.

Fringes as on upperside.

♂ GENITALIA. Uncus formed of two arms, longer and more slender than in *aslauga*, the apices slightly expanded and curving ventrally, with numerous strong spines; at the base of each arm a small, laterally-directed apophysis; tegumen wide; special processes strongly curved as in *aslauga*, the apices broadened, bearing numerous strong spines; valvae typical of the genus, apices falcate, distal end of the aedoeagus bearing a sharp tooth on either side of the dorsal surface; ventral curve deeply excised.

Readily distinguished from the armature of *aslauga* by the longer arms of uncus and by the toothed aedoeagus.

♀. Frons, palpi, antennae and legs as in the male.

UPPERSIDE FORE WING. Orange yellow with fuscous markings, rather lighter than the male; costal border extending about two-thirds from the base, narrower than in the male, not encroaching upon the cell; small yellow marginal dots varying as in the male; no bar over the discocellulars; a small bar extending from the termination of the costal border to midway between veins 6 and 5; apex and marginal border as in the male, but the latter reduced in width between the extremities of veins 3 and 1.

UPPERSIDE HIND WING. Marginal border narrower than in the male, extending from the apex to the anal angle.

Fringes of both wings fuscous, interrupted with white.

UNDERSIDE FORE AND HIND WING. Coloration as in the male, but the two bars crossing the base and middle of the fore-wing cell do not quite reach its lower border.

Length of fore wing: ♂, 14 mm.
" " ♀, 13 mm.

Holotype ♂: Mineni Valley, Manica, S.E. Trop. Afr., in the British Museum (N.H.), B.M. Type No. Rh. 15687.

Allotype ♀: Mineni Valley, Manica, S.E. Trop. Afr., in the British Museum (N.H.), B.M. Type No. Rh. 15688.

Paratypes: Mineni Valley, 4♂; Chirindi Mt., Mashonaland 2♂; Chirindi Forest, Gazaland 1♂; Umtali, Mashonaland 1♀; Mezimbiti, Port. E. Afr. 2♂, all in B.M. (N.H.). S. Rhodesia, Vumba Mtns., 1♂ 1♀ in Stempffer coll. S. Rhodesia, Vumba Mtns., 1♂ 1♀ in Jackson coll.

(9) ***Baliochila neavei*** sp. nov.

(Pl. 3, fig. 6, holotype ♂; fig. 7, allotype ♀; Pl. 6, fig. 34, ♂ genitalia; Pl. 9, fig. 65, ♂, Mozambique)

Types in the British Museum (N.H.).

♂. Frons grey with two lateral fine white lines; palpi, antennae and legs as in *B. barnesi*.

UPPERSIDE FORE WING. Orange yellow with dark brown markings as follows: costal border interrupted with two small yellow dots; some dark scales at base and middle of the cell near the upper edge; a streak covering the discocellulars; a curved patch from the costal border to vein 4; some dark scales between veins 4 and 3; a large apical patch prolonged to the tornus, its inner edge irregular.

UPPERSIDE HIND WING. Orange yellow with a wide dark brown border from the costa to the anal angle.

Fringes of both wings dark brown, interrupted with white.

UNDERSIDE FORE WING. Orange yellow shading to very pale yellow at the inner margin, with shining violet grey markings; four small yellow dots spaced along the costal margin; three transverse streaks crossing the cell, one at its base, one at the middle, the third covering the discocellulars; a larger, curved patch from the costa to vein 2; in the apical zone an oblique line running from the costa to vein 2; a crenulate line, parallel with the margin, from costa to tornus; a shining grey marginal line, wide at apex, narrowing to the tornus.

UNDERSIDE HIND WING. Ground-colour shining violet grey, with six transverse rows of orange-yellow spots, outlined with darker scales; the first row at the base of the wing, the second, in which the spots tend to fuse together, crossing the cell, the third, irregular, at the outer end of the cell, the fourth, also irregular, the fifth, parallel with the margin, the sixth consisting of a series of triangular submarginal spots.

Fringes as on the upperside.

♂ GENITALIA. Uncus consisting of two slender, curved arms, slightly expanded at the apices, which are thickly clad with strong spines; tegumen fairly wide; special processes short and resembling those of *aslauga*; vinculum wide; valvae of the usual shape with strongly falcate apices; aedoeagus long, the distal end bearing a pair of sharply-pointed triangular lobes on its dorsal surface and a deep excision on the ventral face. This species is readily separable from *B. barnesi* by the absence of the triangular apophyses at the base of the uncus arms.

♀. Frons as in the male; second joint of the palpi laterally compressed, clothed with white scales and a scattering of dark ones, third joint almost wholly white; antennae and legs as in the male.

UPPERSIDE FORE WING. Orange yellow with dark brown markings ; costal border reduced, not invading the cell, with three yellow costal dots ; a small streak from the costa covering the upper discocellular ; another from the costa to a little below vein 6 ; apical patch and marginal border narrower than in the male, very reduced towards the tornus.

UPPERSIDE HIND WING. The dark marginal border greatly reduced in width, almost linear towards the anal angle, running inwards from the tips of the veins.

Fringes as in the male.

UNDERSIDE FORE WING. Orange yellow shading to pale yellow at the inner margin, with violet grey markings ; costal border interrupted by four small yellow dots ; four transverse streaks extending inward from the costa, the first at the base, the second crossing the middle of the cell, the third over the discocellulars, and the fourth curving and reaching vein 3 ; in the apical zone an oblique streak, with two small costal yellow dots, extending to vein 4 ; a band of spots, confluent, from the apex to vein 6, then triangular and separated from vein 5 to vein 3 ; a shining grey marginal line, wide at the apex, tapering to the tornus.

UNDERSIDE HIND WING. As in the male, but the violet grey ground-colour a little lighter and the orange spots larger.

Fringes as on the upperside.

Length of fore wing : ♂, 15·8 mm.
,, ,, ♀, 15 mm.

Holotype ♂ : Mlanje, Nyasaland, 16.iv.1913, (S. A. Neave), in the British Museum (N.H.), B.M. Type No. Rh. 15689.

Allotype ♀ : Mlanje, Nyasaland, 21.iv.1913, (S. A. Neave), in the British Museum (N.H.), B.M. Type No. Rh. 15690.

Paratypes : A long series of both sexes from Mlanje ; Brit. Cent. Afr. ; Mandala, 2♂ ; Port. E. Afr., Ruo Valley, 6♂, 1♀ all in B.M. (N.H.) ; E. Afr., Monapo, 8♂ 2♀ in Oxford University Museum. Mozambique, Tendo du Sunque, Gorongoza Dist., 1♂ in coll. Stempffer.

This species exhibits considerable variation in facies, for instance, the example from Mozambique, pl. 9, fig. 65, in which the genital armature is typical, is more slender in build, has the ground-colour much paler on the upperside, with the dark markings reduced and lighter in shade ; the underside hind wing has the ground-colour of a very light violet-grey shade with the yellow spots reduced in number and of paler tint.

(10) ***Baliochila hildegarda*** Kirby (1887)

(Pl. 6, fig. 35, ♂ genitalia (lateral), fig. 36, ♂ genitalia (ventral) ; Pl. 9, figs. 55–60, ♂ and ♀ forms)

Teriomima (?) *hildegarda* Kirby, 1887, *Ann. Mag. Nat. Hist.* (5) **19** : 367, Ashanti. Figured in Rhop. Ex. **1**, Afr. Lyc. pl. 4, figs. 7 and 8.

syn. *Teriomima freya* Smith and Kirby, 1894, Rhop. Ex. 2 : 115, Afr. Lyc. pl. 25, figs. 1 and 22.

Type in the British Museum (N.H.).

In the absence of abdomen and forelegs the sex of the holotype is debatable. In facies it resembles a number of males from the Mombasa region, with reduced costal markings; on the other hand, it may well be a female from almost any locality within the range of distribution of the species. Fig. 55, Pl. 9, shows a ♂ underside resembling that of the type specimen. The locality " Ashanti " is an obvious error, as none of the species of this group have been recorded outside the Eastern half of S. Africa. The species is very variable, with a striking form from the coastal region, very heavily marked, the costal border almost flowing into the apical patch and the hind-wing margins very wide and dark, (Pl. 9, fig. 58.). Two females are also shown in Pl. 9, figs. 56 and 57, illustrating upper and underside of a lightly marked example with dark underside hind wing, figs. 59 and 60 a heavily marked upperside with light underside hind wing.

♂ GENITALIA. Uncus consisting of two short, broad arms, strongly toothed at the apices and covered with small spines. In what is assumed to be the typical form, from the Mombasa region, the two arms are splayed widely apart, but from other regions the uncus shows a number of modifications in this respect, the opposite extreme being reached in certain specimens from N.E. Rhodesia and British Central Africa, wherein the uncus lobes tend to converge slightly at the tips. No subunci; tegumen wide; special processes shorter than in *aslauga* crowned with strong spines; vinculum, anellus and valvae as in *aslauga*; aedoeagus, long, excised on the ventral face near tip. Distal half of valvae hairy.

DISTRIBUTION. Kenya, Tanganyika, Nyasaland, Rhodesia.

(11) ***Baliochila dubiosa*** sp. nov.

(Pl. 3, fig. 8, holotype ♂; fig. 9, allotype ♀; Pl. 7, fig. 37, holotype ♂ genitalia; figs. 38, 39, 40, uncus variations; fig. 41, ♂ genitalia; Pl. 9, figs. 61–64, ♂ forms)

Types in the British Museum (N.H.).

Assembled under this name are a number of forms, probably akin to *B. hildegarda*. In facies they exhibit a considerable amount of variation, but all share a peculiar formation of the uncus. This shape is not absolutely constant from specimen to specimen but, however great the variation, the affinity of the dissected examples is at once apparent. In view of this, the genitalic description is given first and that of the facies later.

♂ GENITALIA. Uncus bifid, clothed with strong spines; the two arms are deeply cleft at their apices and each bears, at its base a small, lateral triangular apophysis, as in *aslauga* and *hildegarda*; tegumen, special processes, vinculum, valvae and aedoeagus as in *hildegarda*. As previously stated, the uncus shape is rather variable, so a number of characteristic forms are figured. The small lateral apophyses are present in specimen no. 3052 from Kilifi, Kenya, fig. 38, but absent in specimen no. 3062, fig. 39 also from Kilifi, as well as in specimen no. 2637, fig. 40 from Meru. Sometimes the two arms are asymmetrical, the apical notch more or less deeply cleft, and so on, but these variations do not appear to indicate racial distinctions.

♂. Frons dark brown with two fine lateral white lines; second joint of the palpi laterally compressed, clothed with white and black scales, third joint white tipped; antennae black, ringed with white, club black; legs black ringed with white.

UPPERSIDE FORE WING. Yellow, with dark brown markings; costal border narrow, not extending into the cell, with three small costal yellow dots; some black scales at the base of the cell and in the centre; a small streak covering the discocellulars; a curved bar running from the costa to vein 2; a large apical patch continued down the border to the tornus, its inner edge forming an even curve.

UPPERSIDE HIND WING. Yellow, with a narrow dark brown marginal border, the inner edge tending to run inward along the veins.

UNDERSIDE FORE WING. Orange-yellow shading to pale yellow towards the inner margin, with markings of shining dark grey; costal border interrupted by four small costal white dots; three transverse bars, one at the base of the cell, one crossing the middle and extending beyond the origin of vein 2, the third covering the discocellulars; from the termination of the costal border, a broad curved bar, rather irregular in outline, reaching vein 2; a shining grey apical zone with two minute white costal spots, prolonged by a tapering marginal border to the tornus; between the veins the marginal border has a double row of small orange spots, decreasing in size towards the tornus.

UNDERSIDE HIND WING. Ground-colour violet grey with five transverse rows of orange-yellow spots, outlined with darker scales, the first row at the base of the wing, the second crossing the middle of the cell, the third, very irregular, at the end of the cell, the fourth and fifth parallel with the margin; between the veins a series of submarginal orange-yellow spots.

Fringes of both wings shining grey.

It seems impossible to find any two specimens exactly alike, even those examples shown by dissection to possess genitalia of identical pattern exhibit bewildering variations of wing marking. Sometimes the dark markings of the fore wing upperside are reduced while the dark marginal border of the hind wing is developed, as in no. 3052 from Kilifi. The costal border of the fore wing sometimes invades the whole of the cell and so the yellow ground colour is reduced to less than half of the wing surface; the hind wing underside ground colour varies between shining dark violet grey, almost black, as in no. 2637 from Meru, to a very light grey, as in no. 3052 from Kilifi. Only by examination of the genital armature can this species be determined with certainty. The specimens referred to above, together with two other examples, are figured on pl. 9, figs. 61–64.

♀. Frons, palpi, antennae and legs as in the male.

UPPERSIDE FORE WING. Orange yellow, rather deeper than in the male, with dark brown markings; costal border very narrow, with two, occasionally three or four very small costal yellow spots; a transverse patch running from the apex of the costal margin to the origin of vein 7; apical patch and marginal border as in the male.

UPPERSIDE HIND WING. Orange yellow, with a linear dark brown margin, sometimes a little broader and tending to run inwards along the veins.

Fringes of both wings interrupted with orange.

UNDERSIDE FORE WING. Orange-yellow shading to pale yellow towards the inner margin; four transverse shining violet grey streaks running from the costa, the first at the base of the cell, the second crossing the middle, the third covering the discocellulars, the fourth reaching vein 4; in the apical zone an oblique streak reaching vein 4, an anteterminal line from near the apex to vein 2, crenulate; marginal line wide at the apex, tapering to the tornus.

UNDERSIDE HIND WING. As in the male, ground-colour and markings varying to a similar degree.

Length of fore wing: ♂, 14 mm.
,, ,, ♀, 14·8 mm.

Holotype ♂: Brit. E. Afr., Uchweni Forest, nr. Witu, 25–27.ii.1912 (S. A. Neave). B.M. Type No. Rh. 15691.
Allotype ♀: Brit. E. Afr., Uchweni Forest, nr. Witu 25–27.ii.1912 (S. A. Neave). B.M. Type No. Rh. 15692.
Paratypes: Brit. E. Afr., Uchweni Forest nr. Witu, Feb.-Mar. 1912 (S. A. Neave). 12♂ 10♀. All in British Museum (N.H.).

(12) ***Baliochila nyasae*** sp. nov.

(Pl. 3, fig. 10, holotype ♂; Pl. 4, fig. 11, allotype ♀; Pl. 7, fig. 42, ♂ genitalia)

Types in the British Museum (N.H.).

♂. Frons blackish grey with two lateral fine white lines; second joint of the palpi laterally compressed, clothed with black and white scales; third joint white at the base and tip; antennae black, ringed white, club black, orange tipped; tarsi black, ringed white.

UPPERSIDE FORE WING. Orange yellow with dark brown markings; costal border running from the base to the extremity of vein 11, where it nearly joins the apical patch, leaving two small costal dots of the yellow ground-colour, one between vein 12 and the costa, the other between veins 11 and 12; some dark scales in the cell, one small streak covering the upper discocellulars, another streak extending from the border to vein 4; a broad apical patch, with a wide marginal border reaching the tornus, inner edge rather irregular.

UPPERSIDE HIND WING. Orange yellow with a dark brown marginal border about 3·5 mm. wide in the centre and running from the apex to the anal angle; inner edge rather irregular.

Fringes black, interrupted with white between the veins.

UNDERSIDE FORE WING. Ground-colour orange yellow, paler towards the inner margin, with markings of lustrous dark violet grey; costal border has five small dots of the ground-colour, four evenly spaced along the border between the base and the extremity of vein 12, the fifth between veins 11 and 12; from the costal border runs a streak at the base of the cell, another at its middle and a third covers the discocellulars; a larger, curved marking runs from the costa to vein 3; in the apical area an oblique line runs from the costa to vein 3; another, crenulate, lies parallel with the marginal border from the apex to vein 2; a marginal line, of fairly even width, extends from the apex to the tornus.

UNDERSIDE HIND WING. Ground-colour lustrous violet grey, with numerous isolated orange-yellow spots arrange in five irregular bands, also a submarginal series of interneural orange spots.

Fringes as on upperside.

♂ GENITALIA. Uncus formed of a pair of slender arms fused together almost to their extremities, leaving a notch at the distal end ; the suture between the arms is clearly discerned under the microscope ; tegumen wide ; special processes short with long fine spines at their ends ; valvae of the usual shape, with slightly falcate apices ; aedoeagus rather short, thick, weakly excised below the tip on the ventral face.

♀. Frons, palpi, antennae and legs as in the male.

UPPERSIDE FORE WING. Orange yellow, rather paler than in the male, with dark brown markings ; costal border narrower than in the male, leaving two or three small yellow dots along the costa ; a small dark spot running from the costal border and ending between veins 6 and 5 ; broad apical patch merging into a wide outer margin which tapers to the tornus, its inner edge irregular.

UPPERSIDE HIND WING. Coloration as in the fore wing, with a narrower marginal border than in the male, about 1·5 to 2 mm., with a very irregular inner edge.

Fringes as in the male.

UNDERSIDE FORE WING AND HIND WING. As in the male, but with the lustrous dark violet grey of the fore wings slightly reduced and the ground-colour of the hind wings rather lighter and duller greyish violet.

Fringes as on the upperside.

Length of fore wing : ♂, 13 mm.
,, ,, ♀, 15 mm.

Holotype ♂ : Mlanje, Nyasaland, 6.i.13 (S. A. Neave). In British Museum (N.H.), B.M. Type No. Rh. 15693.

Allotype ♀ : Mlanje, Nyasaland, 6.i.13 (S. A. Neave). In British Museum (N.H.), B.M. Type No. Rh. 15694.

Paratypes : Mlanje, Nyasaland, Nov.-April, 11♂ 10♀, Ruo Valley, Nyasaland, 1♀, all in the British Museum (N.H.).

(13) ***Baliochila stygia*** Talbot (1935)

(Pl. 4, fig. 12, neallotype ♀ ; Pl. 7, fig. 43, ♂ genitalia)

Teriomima minima f. ***stygia*** Talbot, 1935, *Ent. Mon. Mag.* (3) **21** : 72, pl. 1, fig. 4, ♂, Kenya. Rabai, 700′, 14 m. N.W. of Mombasa (K. St. A. Rogers).

♂. Holotype in the Hope Department of Entomology, University Museum, Oxford.

♀. Not previously described.

UPPERSIDE FORE WING. Orange yellow with dark brown markings ; wide costal border covering most of the cell, leaving three small costal yellow dots ; a large round spot flowing from the costal border and covering the discocellulars ; an extensive apical patch prolonged by a wide apical border, tapering to the tornus, the inner edge of the apical patch and of the marginal border forming an even curve ; some black scales scattered over the orange-yellow area.

UPPERSIDE HIND WING. Colouring as in the fore wing, but with the marginal border a little less wide, with an irregular and ill-defined inner edge.

Fringes of both wings black with some yellow hairs.

UNDERSIDE FORE WING. Ground-colour yellow, becoming paler towards the inner margin, with dark grey markings as follows ; costal border leaving four small costal white dots ; a spot at the base of the cell, one in its middle ; a streak covering the discocellulars ; an oblique stripe curving from the costa to vein 3 ; a large apical patch leaving two small costal white dots, divided by two series of confluent, indistinct orange yellow spots parallel with the outer margin ; marginal line wide at the apex, tapering to the tornus.

UNDERSIDE HIND WING. Ground-colour shining violet grey with the usual six transverse bars of orange-yellow spots, outlined with darker scales, the fourth row from the base being more strongly accentuated than the rest ; marginal line shining grey.

Fringes as on the upperside.

The general appearance of the female underside is lighter than that of the male ; the hind wing appears almost unmarked unless closely inspected, owing to the dull tinge of the markings.

Length of fore wing : ♀, 11·2 mm.

♂ GENITALIA. Uncus consisting of two pairs of short and slender points ; no subunci ; tegumen very wide ; special processes stout, rather short, clothed with bristles ; vinculum broad ; anellus sheathing the base of the aedoeagus ; valvae oblong, with falcate pointed apices ; aedoeagus small, deeply excised ventrally near the distal end.

Holotype ♂ : Mombasa, 14 m. N.W. of Rabai, 700′, 21.xii.09 (St. A. Rogers). Oxford Univ. Mus.

Neallotype ♀ : Zanzibar, 23.ix.24, *ex* D. M. Cator coll., in British Museum (N.H.), B.M. Type No. Rh. 15695 ; in addition there are three more females bearing the same data in the British Museum (N.H.).

(14) ***Baliochila woodi*** Riley (1943)

(Pl 7, fig. 44, ♂ genitalia)

Teriomima woodi Riley, 1943, *Entomologist*, **76** : 225, Nyasaland, Mt. Mlanje, 12.ii.38, 2500′, (R. C. Wood).

Types in the British Museum (N.H.).

♂ GENITALIA. Uncus in the form of a flattened lobe, narrow at the base, expanding towards the apex, where it is slightly excised and inclined ventrally ; no subunci ; tegumen of moderate size ; special processes very long and slender, clothed with short bristles ; vinculum wide ; valvae of the usual shape with slightly falcate, slender and acute apices ; aedoeagus long, tapering evenly to a truncate tip. Some hairs on the uncus, valvae hairy.

DISTRIBUTION. Nyasaland, Mlanje.

(15) ***Baliochila fragilis*** sp. nov.

(Pl. 4, fig. 13, holotype ♂; fig. 14, allotype ♀; Pl. 7, fig. 45, ♂ genitalia)

Types in the British Museum (N.H.).

♂. Frons blackish brown with two lateral fine white lines; second joint of the palpi laterally compressed, clothed with white scales with a scattering of black ones; third joint white tipped; antennae black, ringed with white, club black, orange tipped; tarsi black, ringed with white.

UPPERSIDE FORE WING. Orange yellow with dark brown markings, ground-colour paler in some examples; some dark scales at the base of the wing; a small dark streak over the discocellulars, absent in some specimens; a dark oblique marking extending from the costa, leaving a small yellow dot between the costa and vein 11, to vein 4, sometimes 5; apical patch with an irregular inner edge, prolonged by a broad marginal border ending at the extremity of vein 3, but continued in the form of small interneural patches to the tornus.

UPPERSIDE HIND WING. Ground-colour orange yellow, sometimes pale yellow, with a dark marginal border, linear in most examples, occasionally as much as one-and-a-half millimetres in width, with an irregular inner edge.

Fringes of both wings dark brown, interrupted with white on the hind wings.

UNDERSIDE FORE WING. Orange yellow, paler towards the inner margin, with dark brown markings as follows: costal border with four, sometimes three, small yellow dots; three small bars crossing the cell at its base, centre and over the discocellulars respectively; an oblique, curved streak running from the costa to vein 3, sometimes 4; apical patch prolonged by a marginal border tapering to the tornus; two indistinct rows of interneural orange spots running parallel with the outer margin, the inner row very small, in some examples obsolete.

UNDERSIDE HIND WING. Ground-colour greyish brown, sometimes lighter, sometimes darker, with six rows of small, indistinct orange-yellow spots, the fourth row from the base being the most prominent, the fifth and sixth parallel with the margin. In some specimens the spots can only be seen with the aid of a microscope.

Fringes brown, interrupted with white.

♂ GENITALIA. Uncus in the form of a flattened oval disc, deeply excised at the apex, supported on a longish stalk or neck, and bearing a number of short, sturdy spines; tegumen triangular; special processes very long and slender, almost straight, clothed with long, fine spines over their whole length; vinculum wide; valvae of the usual shape, distal ends narrow, strongly falcate; aedoeagus short and thick, distal end truncate. In facies the males are somewhat variable, but their genitalia are absolutely constant.

♀. Frons, palpi, antennae and tarsi as in the male.

UPPERSIDE FORE WING. Yellow with dark brown markings; costal border narrow, with two small costal yellow dots; an oblique spot from the costa to vein 5; dark apical spot and marginal border as in the male.

UPPERSIDE HIND WING. Yellow, with a linear dark marginal border from the costa to the anal angle.

Fringes blackish brown interrupted with white near the apex of the fore wings and the hind wings.

UNDERSIDE FORE WING. Yellow, paler towards the inner margin, with dark brown markings as follows: three small yellow dots spaced along the costa, some dark scales in the cell near its base, at its centre and over the disocellulars; a dark oblique spot from the costa to vein 4; apical patch with an irregular inner edge, with the marginal border ending between veins 2 and 3; two rows of orange yellow spots running parallel with the outer margin, rather more clearly marked than in the male.

UNDERSIDE HIND WING. Ground colour slightly darker than in the male, the transverse rows of orange spots paler in colour and appearing more distinct than in the male.

Fringes as on the upperside.

Length of fore wing: ♂, 12 mm.
" " ♀, 13·6 mm.

Holotype ♂: Kenya, Meru, 6000′, May, 1946 (T. H. E. Jackson), in the British Museum (N.H.), B.M. Type No. Rh. 15696.

Allotype ♀: Kenya, Meru, 6000′, May, 1946 (T. H. E. Jackson), in the British Museum (N.H.), B.M. Type No. Rh. 15697.

Paratypes: Kenya, Nairobi, 7♂ 2♀; Kibwezi, 3000′, 9♂ 1♀; Chuka, 5600′, 10♂ 2♀; Makindu, 3300′, 1♂; Masongaleni, 3000′, 2♂; Gheni, Ukamba, 1♂; Meru, 5600′–6000′, 3♂ 1♀; Samburu, 1♂; Muani, 1♀; Hills of Teita, 1♀; Mto-ya-mawe, 1♀; Kedai, 1♂; Somaliland, 1♂ 1♀, all in British Museum (N.H.); Nairobi, 1♂, in Univ. Mus. Oxford. Meru, 1♂ 2♀ in coll. Jackson. Kibwezi, 5♂; Bura Hill, 1♂, in coll. van Someren. Meru, 2♂ 1♀; Kima (Kenya), 1♂, in coll. Stempffer.

(16) ***Baliochila minima minima*** Hawker Smith (1933)

(Pl. 4, fig. 15, neallotype ♀; Pl. 7, fig. 46, ♂ genitalia)

Teriomima minima Hawker Smith, 1933, *Stylops*, **2**: 6, Kenya, Uchweni Forest, Witu, Feb. 1912 (S. A. Neave).

Holotype ♂ in the British Museum (N.H.).

♀ not previously described.

UPPERSIDE FORE WING. Yellow, tinged with orange, markings blackish brown; some dark scales at the base of the costa and of the cell; a small costal spot at the extremity of vein 12, another extending obliquely from the costa to vein 5; apical patch prolonged by the marginal border, which tapers to the tornus, the inner edge irregular.

UPPERSIDE HIND WING. Marginal border linear, with an ill-defined and irregular inner edge.

Fringes dark brown, interrupted with yellow.

UNDERSIDE FORE WING. Yellow, with silvery-grey markings; costal border with three small dots; a spot at the base of the cell, one in the middle and a streak over the discocellulars ; a curved streak from the costa to vein 3 ; a streak parallel with the outer margin from near the apex to vein 2 ; a marginal line wide at the apex and tapering to the tornus.

UNDERSIDE HIND WING. Yellow, with five transverse silvery-grey stripes, the first near the base, the second crossing the cell, the third irregular, the fourth and fifth parallel with the marginal border ; marginal line silvery grey.

Fringes of fore wing dark brown interrupted with yellow, of hind wing yellow towards the apex, mixed with brown towards the anal angle.

Length of fore wing : ♀, 10·1 mm.

Neallotype ♀ : Kenya, Uchweni Forest, nr. Witu, 25–27.xi.1912 (S. A. Neave), in British Museum (N.H.). B.M. Type No. Rh. 15698.

♂ GENITALIA. Uncus forked from an oval base, the two prongs slender and sinuate ; no subunci ; tegumen rather small ; special processes long and slender, clothed with stiff bristles ; vinculum wide ; anellus sheathing the base of the aedoeagus ; valvae oblong, with falcate apices ; aedoeagus short and thick, with a cleft tip.

DISTRIBUTION. Kenya, Uchweni Forest, near Witu.

(17) ***Baliochila minima latimarginata*** Hawker Smith (1933)

(Pl. 4, fig. 16, neallotype ♀ ; Pl. 7, fig. 47, ♂ genitalia (ventral) ; Pl. 8, fig. 48. ♂ genitalia (lateral))

Teriomima minima latimarginata Hawker Smith, 1933, *Stylops*, **2** : 7, Kenya, Rabai, Mombasa, 1♂, 1906 (K. St. A. Rogers).

Holotype ♂ in the British Museum (N.H.). ♀ not previously described.

♂ GENITALIA. Closely resembles *m. minima* save in the relative length of the special processes and the lobes of the uncus. Whereas in *m. minima* all four tips appear of equal length, in *latimarginata* the tips of the special processes project well beyond those of the uncus.

♀. The description given of the female of *m. minima* would answer equally well for the form now considered, but there are some examples in which the marginal borders of the upperside hind wings are nearly as broad as in the male.

Length of fore wing : ♀, 9·5 mm.

Neallotype ♀ : B.E.A., Rabai, nr. Mombasa, 15.iii.1912 (S. A. Neave) in the British Museum (N.H.).

DISTRIBUTION. Rabai, Mombasa ; Moa, Tanganyika Terr. ; B.E.A., nr. Wangi ; Jilore, 19 miles W. of Malindi ; Shimba Hills ; Kwale ; Kilifi.

(18) ***Baliochila minima amanica*** ssp. nov.

(Pl. 4, fig. 17, holotype ♂ ; fig. 18, allotype ♀ ; Pl. 8, fig. 49, uncus and special processes)

Types in the British Museum (N.H.).

♂. UPPERSIDE FORE WING. Orange yellow with blackish-brown markings ; costal border not invading the cell, bearing four small costal yellow dots ; some dark scales in the base of the cell, in the middle and over the discocellulars; running from the costal border the large apical patch is prolonged by a marginal border tapering to the tornus, the inner edge of apical patch and marginal border irregular.

Upperside hind wing. Orange yellow with the marginal border reduced to a series of isolated spots at the extremities of veins 4 to 1b.

Fringes of fore wings black interrupted with orange yellow, of hind wings orange yellow with black at the extremities of the veins.

Underside fore wing. Orange yellow shading to pale yellow towards the inner margin, with lustrous black markings as follows: six transverse stripes running from the costa, the first crossing the base of the cell, the second its middle, the third covering the discocellulars, the fourth reaching vein 4, the fifth, oblique, also reaching vein 4, the sixth, linear, from near the apex to vein 3; a black marginal line near the tips of the wings and near the tornus.

Underside hind wing. Orange yellow with five transverse stripes of lustrous blackish tint, the first from vein 8 to 1a, crossing the base of the cell; the second from the costal to the abdominal border, crossing the middle of the cell; the third very irregular, also crossing the whole wing and covering the discocellulars; the fourth and fifth parallel with the outer margin; black marginal spots at the end of the veins. The general appearance of the underside gives an impression of vivid contrast between ground-colour and markings.

Fringes as on the upperside.

♂ genitalia. Differ from those of *minima minima* only in the relative length of the special processes, which are short and thick, projecting considerably less than the tips of the uncus.

From 100 miles N.W. of Mombasa, Sagalla Mtn., 3500′, a series of males and females have been collected of a race identical in genitalic structure but differing in facies. In the males the marginal border of the upperside hind wing is more developed, irregular but continuous from the end of vein 6 to the anal angle; the underside markings are of much lighter tint, shining grey. The general aspect is much less contrasted. In the female the ground colour is lighter than in the male, the costal border reduced to small costal black dots, apical patch as in the male, no marginal border to the hind wings; fringes as in the male. The underside resembles that of the male; fringes of fore wings dark brown interrupted with orange yellow, of hind wings ochre yellow.

Length of fore wing: ♂, 12 mm.
,, ,, ♀, 12 mm.

Holotype ♂: Tanganyika Terr., Amani, May-Sept., 1945 (native collector), T. H. E. Jackson. In British Museum (N.H.) B.M. Type No. Rh. 15700.

Allotype ♀: Brit. E. Afr., Sagalla, 3500′, *c.* 100 miles N.W. of Mombasa (St. A. Rogers). In British Museum (N.H.), B.M. Type No. Rh. 15701.

Paratypes: Hills of Teita, Kilimanjaro, 2♂; Amani, 4♂; Sagalla, 1♂, all in B.M. (N.H.); Sagalla, 11♂ 4♀; Amani, 3♂; Arabuka Forest, 1♂, all in coll. Oxford Univ. Mus. Sagalla, 1 ♂; Amani, 1♀; Kasigau, 1♀ in coll. van Someren. Amani, 2♂ 2♀; Turiani, Tanganyika Terr., 1♀ in coll. Jackson.

(19) ***Baliochila lipara*** sp. nov.

(Pl. 4, fig. 19, holotype ♂; fig. 20, allotype ♀; Pl. 8, fig. 50, ♂ genitalia)

Types in the British Museum (N.H.).

♂. Frons blackish grey with two fine lateral white lines; second joint of the palpi laterally compressed, clothed with brown and white scales, third joint white at the base and the tip; antennae black, ringed with white, club black, orange tipped; tarsi brown, ringed with white.

UPPERSIDE FORE WING. Orange yellow, of a deeper tint than in the associated species, with dark brown markings; costal border narrow, not invading the cell, two small orange costal dots; a small rectangular spot from the costa to vein 7, almost running into the apical patch; the apex broadly dark brown, marginal border tapering to a line at the tornus, its inner edge irregular.

UPPERSIDE HIND WING. Deep orange yellow, the marginal border indistinct, almost linear, from the costa to the anal angle. In an example from Umtali (coll. Stempffer) the marginal border is of a reddish tinge.

Fringes of both wings dark brown, interrupted with white.

UNDERSIDE FORE WING. Orange yellow, paler towards the inner margin, with shining dark violet-grey markings; costal border with four small yellow dots; running from the costal border are four patches, one over the base of the cell, one over the middle, one covering the discocellulars, the fourth larger, curved, reaching vein 4; apical patch broad, with two yellowish-white costal spots; marginal border tapering to the tornus, its inner edge rather irregular; a series of three oblique orange streaks; a submarginal series of interneural orange spots.

UNDERSIDE HIND WING. Ground-colour is the same as the markings of the fore wing underside, with six transverse rows of small orange spots, the first row at the base of the wing, the second crossing the cell, the third broken and indistinct, the fourth and fifth parallel with the outer margin, the sixth submarginal; the fourth row has the outer edges of its spots outlined with darker scales, and forms an angled line crossing the wing from the costa to the abdominal margin. In some specimens the orange markings are greatly reduced and the general impression is then of a uniformly marbled grey.

Fringes as on the upperside.

♂ GENITALIA. Uncus formed of two small lobes with blunt apices; tegumen wide; special processes highly developed as in *minima*, densely covered with long, fine spines; vinculum wide; valvae oblong, with falcate apices; aedoeagus long, its distal end deeply notched, the dorsal lobe cut obliquely, the ventral lobe curved and slightly expanded at the tip.

The genitalia plainly indicate the affinity of this species with *minima*, despite the discrepancy in size.

♀. Frons, palpi, antennae and tarsi as in the male.

UPPERSIDE FORE WING. Orange yellow, paler than in the male, with similar dark brown markings.

UPPERSIDE HIND WING. As in the male. The Umtali example in the Stempffer coll. has the marginal border even more reddish than in the male from that locality.

Fringes of fore wings dark brown interrupted with white, of hind wings whitish towards the apex, dark brown towards the anal angle.

UNDERSIDE FORE WING. Orange yellow, paler towards the inner margin with lustrous dark violet-grey markings; costal border with four small yellow dots; four transverse markings as in the male; apical zone not so dark as in the male, the orange spots being larger and the marginal border ending at vein 3.

UNDERSIDE HIND WING. Ground-colour a little lighter than in the male, with the orange spots larger; the transverse, angled line, no. 4 from the base, quite indistinct.

Fringes of both wings brown, interrupted with white.

Length of fore wing: ♂, 15 mm.
" " ♀, 14 mm.

Holotype ♂: Nyasaland, Mlanje, 31.xii.1912 (S. A. Neave) in the British Museum (N.H.), B.M. Type No. Rh. 15702.

Allotype ♀: Nyasaland, Mlanje, 20.xi.1912 (S. A. Neave) in the British Museum (N.H.), B.M. Type No. Rh. 15703.

Paratypes: Nyasaland, Mlanje, 3♂ 2♀; Zomba, 2♂; Plains of Lake Chilwa, 1♂; Kenya, Rabai, 1♂ 2♀; Mashonaland, Umtali, 2♂; all in the British Museum (N.H.); Kenya, Rabai, 1♂ 2♀ in Oxford Univ. Mus.; Kenya, Sagalla, 2♂ 1♀; Kasigau, 1♀; Kibwezi, 1♀ in coll. van Someren. Kenya, Mombasa, 1♀ in coll. Jackson. S. Rhodesia, Umtali, 1♂ 1♀ in coll. Stempffer.

(20) ***Baliochila singularis*** sp. nov.

(Pl. 4, fig. 21, holotype ♂; Pl. 5, fig. 22, allotype ♀; Pl. 8, fig. 51, ♂ genitalia)

Types in the British Museum (N.H.)

(So named because of its isolated position in the genus.)

♂. Frons blackish grey with two fine lateral white lines; second joint of the palpi laterally compressed, clothed with brown and white scales; third joint dark brown, white tipped; antennae black, ringed with white, club black with a few white scales; tarsi brownish black, ringed with white.

UPPERSIDE FORE WING. Pale orange yellow with light brown markings as follows: An oblique streak running from the costa to vein 4, well separated from the apical patch; apical patch smaller than in the related species, triangular, terminating at the extremity of vein 4; no marginal border between 4 and the tornus.

UPPERSIDE HIND WING. Pale orange yellow without markings.

Fringes of fore wing brown, interrupted with white towards the apex, of hind wing dirty white.

UNDERSIDE FORE WING. Pale yellow, orange tinged towards the costa; markings as on the upperside; apical patch very pale brown.

UNDERSIDE HIND WING. Ground-colour pale brown, with a sprinkling of yellow scales; the only marking, scarcely visible, is a transverse, angled, darker line from the costa to the abdominal border.

Fringes of fore wing light brown, of hind wings light brown at the base, degraded white in the distal half.

♂ GENITALIA. Uncus consisting of two curved lobes mounted upon a stalk or neck, the latter exceeding the former in length ; tegumen triangular ; no special processes ; vinculum wide ; valvae of the usual shape, with strongly falcate apices ; aedoeagus long, subcylindrical, with a pointed, ventrally directed distal end ; anellus lobes highly developed, long, slender and excurved at the apices, which are heavily spinous. It is considered that the formation of this armature indicates that *singularis* is a link between the preceding species and those of the genus following. The special processes are lacking, but the anellus lobes are highly developed. The uncus, however, exhibits no fusion with the eighth tergite.

♀. Frons, palpi, antennae and tarsi as in the male.

UPPERSIDE FORE WING. Ground-colour pale yellow, some light brown scales at the base of the costa ; an oblique streak running from the costa to vein 4, light brown from the costa to vein 10, darker from vein 10 to vein 4 ; apical patch as in the male.

UPPERSIDE HIND WING. Pale yellow, no markings.

Fringes of both wings pale brown, interrupted with white.

UNDERSIDE FORE WING. As in the male.

UNDERSIDE HIND WING. Ground-colour lighter than in the male, markings similar.

Fringes as on the upperside.

Length of fore wing : ♂, 14 mm.
" " ♀, 15·8 mm.

Holotype ♂ : S. Africa, Durban, 15.ix.23, *ex* coll. W. Feather, in British Museum (N.H.), B.M. Type No. Rh. 15704.

Allotype ♀ : S. Africa, Durban, 15.ix.23, *ex* coll. W. Feather, in British Museum (N.H.), B.M. Type No. Rh. 15705.

Paratypes : S. Rhodesia, Umtali, 3.viii.27 (*ex* coll. Feather) 1♂ ; Matabeleland, Filabusi, 2.ix.23, 1♂, all in British Museum (N.H.); Durban, 1♂ in coll. T. H. E. Jackson.

Genus ***CNODONTES*** gen. nov.

Type of the genus : *Durbania pallida* Trimen, 1898.

Eyes, palpi, antennae, legs, wingshape and *neuration* as in *Teriomima* and *Baliochila*.

♂ GENITALIA. Exhibit a peculiarity of structure unknown to the authors in any other genus of African or Holarctic Lycaenidae. The uncus is fused to the eighth tergite, which forms a sort of guard or sheath. This feature suggested the name of the genus. There are no subunci ; tegumen triangular with two long, digitate processes springing from its base, these processes in no way connected with the anellus ; vinculum wide ; valvae as in the preceding genus ; aedoeagus long ; a pair of long, slender arms arising from the dorsal surface of the anellus and resting parallel with the two processes from the base of the tegumen ; uncus and valvae pilose. It seems that, in this genus, the " special processes " of *Baliochila* have divided into two independent parts, one remaining attached to the tegumen, the other to the anellus.

(21) *Cnodontes pallida* Trimen (1898)

(Pl. 5, fig. 23, neallotype ♀; pl. 8, fig. 52, ♂ genitalia)

Durbania pallida Trimen, 1898, *Trans. Ent. Soc.*, **1898** : 12, pl. 1, fig. 7, ♂, fig. 8, ♀. Mashonaland, Gadzima, Umfuli R. (G. A. K. Marshall).

Types in the British Museum (N.H.).

The specimen described by Trimen as the female of this species is, in fact, another male, the genitalia identical with those of the holotype. This error well illustrates the danger of determination on superficial characters in this group. Very few examples of this species are available, not a single female from Mashonaland among them. Having a male and a female from N. Bechuanaland, Ghanzi, Mongalatsila, both taken by the same collector on the same day (18.iii.1925, J. Maurice), and bearing a strong superficial resemblance to one another, it is considered reasonable to describe this female as the neallotype, the male having proved a true *pallida* on dissection.

UPPERSIDE FORE WING. Ground-colour rich orange yellow, markings dark brown ; costal band not invading the cell, except for a few dark scales on the discocellulars ; three small costal yellow dots ; a patch of darker brown running from the costa to vein 4 ; apical patch continued as a tapering marginal border to the tornus, inner edge broken.

UPPERSIDE HIND WING. Ground-colour as on fore wing ; an indistinct, linear marginal border from the apex to the anal angle.

Fringes of fore wing brownish, interrupted with white near the apex ; of hind wings white interrupted with brown from the apex to vein 4, then brown to the anal angle.

UNDERSIDE FORE WING. Deep orange yellow at the costal margin, paler towards the inner margin ; costal and apical bands pale brown, the costal with four small yellowish dots and a broken line of white scales on the anterior margin ; in the cell are three evenly spaced dark brown patches ; a strongly defined dark patch from the costa to vein 4 ; running through the apical patch and parallel with the outer margin are two rows of weakly defined orange spots, diminishing in size from the apex towards the tornus and merging into the ground-colour between veins 4 and 3.

UNDERSIDE HIND WING. Ground-colour pale fuscous, with six irregular transverse rows of orange-yellow spots, the fourth from the base being most conspicuous as it is outlined with an irregular zone of darker scales.

Length of fore wing : 17 mm.

Neallotype ♀ : N. Bechuanaland, Ghanzi, Mongalatsila, 18.iii.25 (J. Maurice), in the British Museum (N.H.), B.M. Type No. Rh. 15706.

♂ GENITALIA. Uncus a simple lobe with a rounded apex, fused to the eighth tergite as stated in the general description ; no subunci ; processes of the tegumen long and slender, with hooked apices ; vinculum wide ; valvae of the usual shape, apices weakly falcate ; aedoeagus long, subcylindrical, distal end pointed ; anellus lobes very long and slender, slightly spatulate at the apices. Uncus, tegumenal processes and valvae hairy.

DISTRIBUTION. Rhodesia, E. bank of the Loangwa River, N. of Zumbo; N. Bechuanaland; Port. E. Africa.

(22) *Cnodontes vansomereni* sp. nov.

(Pl. 5, fig. 24, holotype ♂; fig. 25, allotype ♀; Pl. 8, fig. 53, ♂ genitalia (ventral); fig. 54, ♂ genitalia (lateral); Pl. 9, fig. 66, ♂, Katanga)

Types in the British Museum (N.H.).

♂. Frons blackish grey with two lateral fine white lines; second joint of the palpi laterally compressed, clothed with white scales and a sprinkling of brown ones; third joint white at the base and the tip; antennae black, ringed with white, club black; tarsi dark brown, ringed with white.

UPPERSIDE FORE WING. Pure yellow, not orange tinged, with dark brown markings; some dark scales between the costa and vein 12, a dark oblique streak from the costa to vein 4, leaving a small yellow dot between the costa and vein 11, almost running into the apical patch; apical patch triangular, with a small yellow dot between veins 7 and 8, inner edge of patch irregular; marginal border greatly reduced in width from the end of vein 4 to the tornus, where it is linear.

UPPERSIDE HIND WING. Pure yellow, no dark markings.

Fringes very dark brown, interrupted with white near the apex of the fore wings and round the hind wings.

UNDERSIDE FORE WING. Yellow, paler towards the inner margin; brown costal border extending to vein 11, with two small yellow spots, one between vein 12 and the costa, the other between veins 11 and 12; some brown scales in the cell near the upper border, some over the discocellulars; an oblique streak extending from the costa almost to vein 4, brown from the costa to vein 6, darker brown from 6 to its lower edge, the outer edge of this streak almost confluent with the apical patch; apex and marginal border light reddish brown, the border tapering to a line at the tornus, the inner edge of the apical patch and the border forming an even curve; a series of very indistinct orange spots between the veins and parallel with the margin.

UNDERSIDE HIND WING. Ground-colour light reddish brown, varying to a light yellowish grey, with nearly obsolete rows of yellow spots, the row most visible being outlined with darker scales and reaching from the end of vein 8 on the costa to the abdominal border, forming almost a right angle at the level of vein 5.

Fringes blackish brown.

A number of examples, notably a male from Katanga, pl. 9, fig. 66, look very different from the typical form, being much paler both on upperside and underside, but the genitalia establish their identity beyond doubt.

♂ GENITALIA. Uncus small, triangular, with a rounded apex; fused to it is the eighth tergite, which forms behind it a hood or guard; the uncus is attached to a tegumen of moderate size by a semi-transparent unsclerotised membrane; from the base of the tegumen arise two digitate lobes with rounded apices, covered with long, fine hairs. These lobes are not connected to the anellus. Vinculum wide; valvae of the usual shape with serrated apices terminating in fine curved points;

aedoeagus long, distal end pointed and ventrally inclined; anellus lobes long and slender, apices slightly spatulate and curving towards the special processes.

♀. Frons, palpi, antennae and tarsi as in the male.

Upperside fore wing. Lighter than in the male, similarly marked.

Upperside hind wing. Without markings.

Underside fore wing. Yellow, paler towards the inner margin, markings as in the male.

Underside hind wing. Light reddish brown in the allotype, but varying as in the male, with an almost invisible pattern of orange-yellow spots.

Fringes brown with a few whitish interruptions.

Length of fore wing: ♂, 15 mm.
,, ,, ♀, 15·8 mm.

Holotype ♂: Migori Valley, 4200′, S. Kavirondo, Kenya (T. H. E. Jackson), in British Museum (N.H.), B.M. Type No. Rh. 15707.

Allotype ♀: Migori Valley, 4200′, S. Kavirondo, Kenya (T. H. E. Jackson), in British Museum, (N.H.), B.M. Type No. Rh. 15708.

Paratypes: Migori Valley, 4200′, 2♂ 2♀; Nyasaland, Shire Valley, 3♂ 1♀; Tanganyika Terr., District of the Great Craters, 2♂; N. Rhodesia, Luangwa Valley, 3000′–1800′, 4♂ 1♀; N. Rhodesia, Chambezi Valley, 4500′, 2♂ (T. A. Barnes), 1♂ (S. A. Neave); Belgian Congo, Kasenga, 3♂ 2♀; Katanga, 1♂ 1♀; Lualaba River, 1♂; Angola, Kalweba River, 1♂; all in British Museum (N.H.). E. Afr., Kongwa, *c.* 3000′, 3♂; St. Michael's Mission, 1♂; Itigi, *c.* 150 m. E. of Tabora, 1♂; N.E. Rhodesia, Loangwa Valley, 24♂ 9♀; Chambezi Valley, Chinsali Dist. and Kasama Dist., 7♂ 2♀; all in Oxford Univ. Mus. Hope Fountain, 2♀ in coll. Jackson. Kenya, Suna, 1♂; Belgian Congo, Katanga, Lupweshi River, 1♂ 1♀; in coll. Stempffer. S. Kavirondo, Suna, 5♂ 3♀; in coll. van Someren.

4. CONCLUSIONS

While the *Teriomima* sensu stricto have typical Liptenine genitalic armatures, the two new genera, with their special developments, may well belong to a different group. Whether they have a common origin, or constitute an outstanding example of convergence of external characters, is debatable. The existence of *B. singularis* rather suggests that the former is the correct assumption, as this species has the uncus formation of *Baliochila*, the anellus lobes of *Cnodontes*, but no "special processes." The wealth of new forms from Mlanje, Nyasaland, revealed by the intensive collecting of Dr. S. A. Neave in 1912, 1913 and 1914, suggests that similar intensive methods, employed in other localties favourable to this group, might well be rewarded by the discovery of many more.

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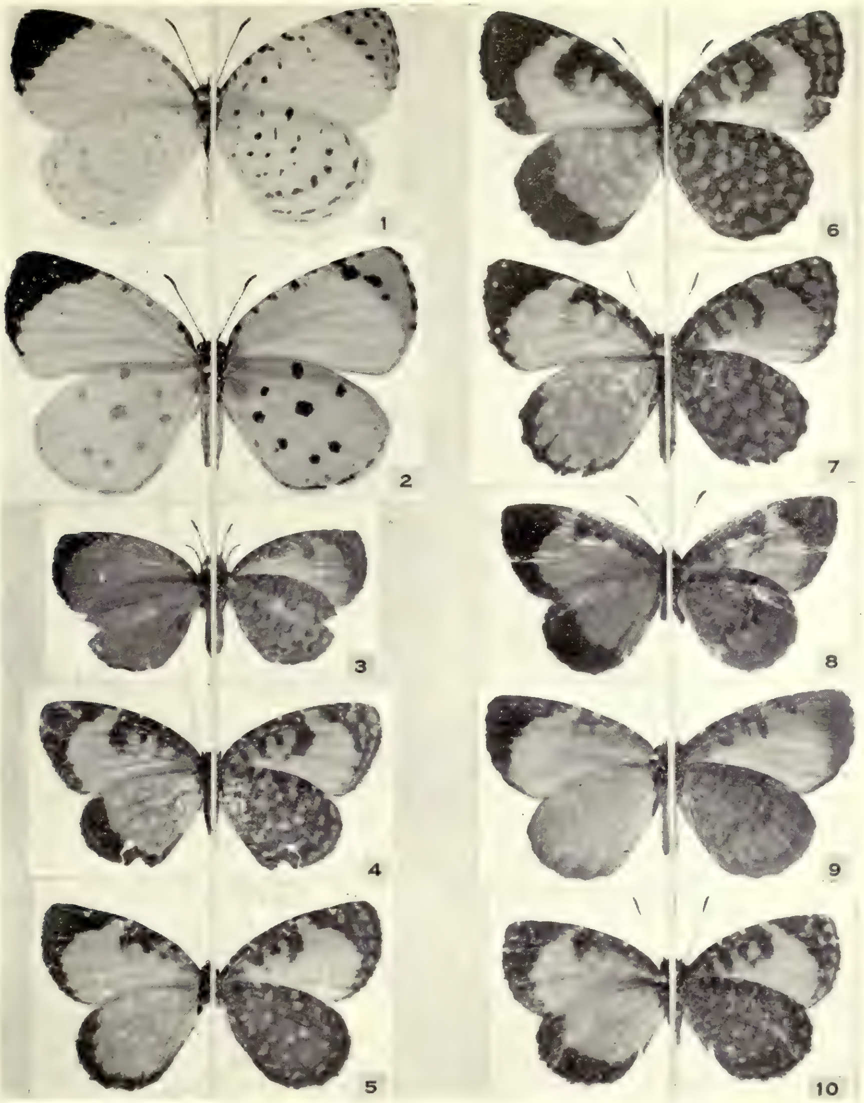


PLATE 3

Uppersides (left) and undersides (right) of the following: (1) *Teriomima subpunctata* Kirby, neallotype ♂. (2) *Teriomima puella* Kirby, neallotype ♀. (3) *Teriomima parva* Hawker Smith, neallotype ♀. (4) *Baliochila barnesi* gen. et sp. nov., holotype ♂. (5) *Baliochila barnesi* allotype ♀. (6) *Baliochila neavei* sp. nov., holotype ♂. (7) *Baliochila neavei* allotype ♀. (8) *Baliochila dubiosa* sp. nov., holotype ♂. (9) *Baliochila dubiosa*, allotype ♀. (10) *Baliochila nyasae* sp. nov., holotype ♂.

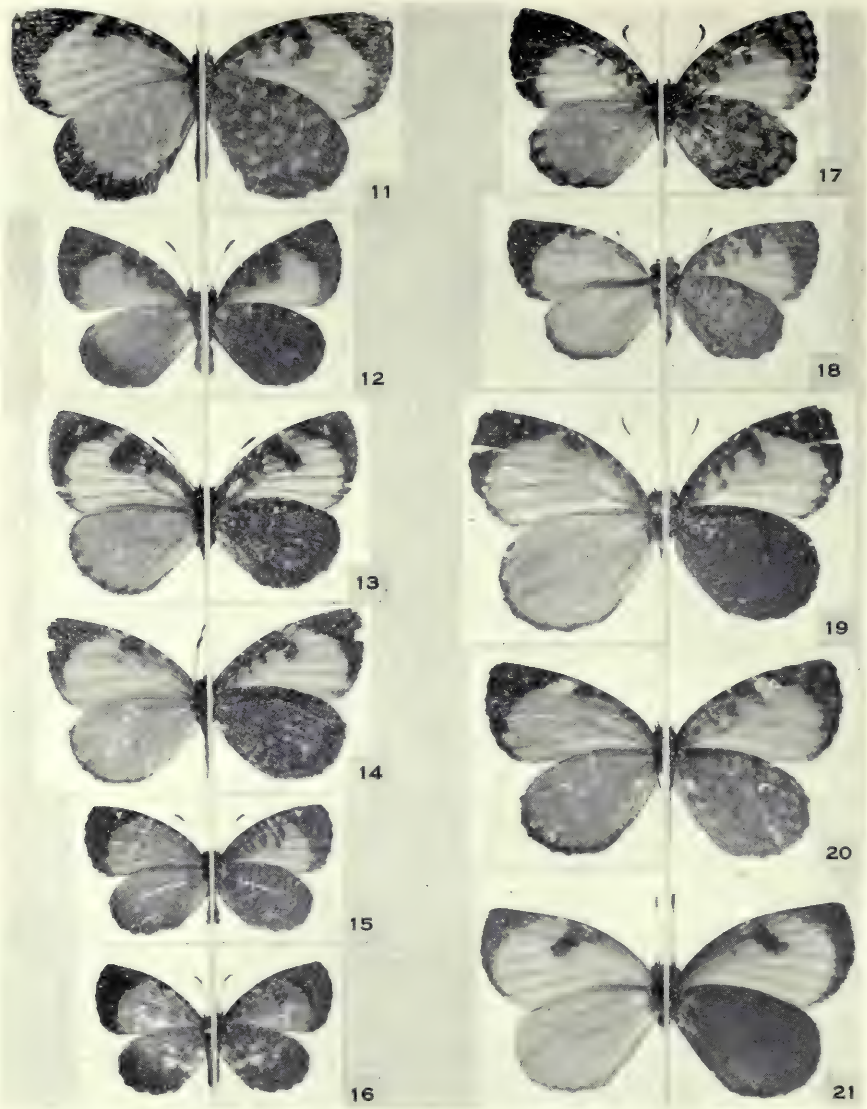
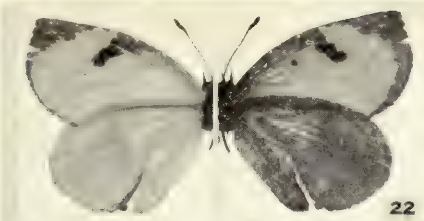


PLATE 4

(11) *Baliochila nyasae*, allotype ♀. (12) *Baliochila stygia* Talbot, neallotype ♀. (13) *Baliochila fragilis* sp. nov., holotype ♂. (14) *Baliochila fragilis*, allotype ♀. (15) *Baliochila minima minima* Hawker Smith, neallotype ♀. (16) *Baliochila minima latimarginata* Hawker Smith, neallotype ♀. (17) *Baliochila minima amanica* ssp. nov., holotype ♂. (18) *Baliochila minima amanica*, allotype ♀. (19) *Baliochila lipara* sp. nov., holotype ♂. (20) *Baliochila lipara*, allotype ♀. (21) *Baliochila singularis* sp. nov., holotype ♂.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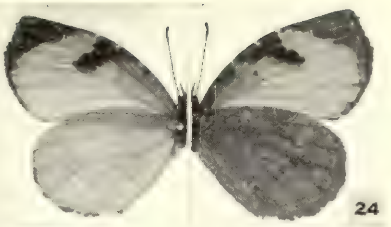
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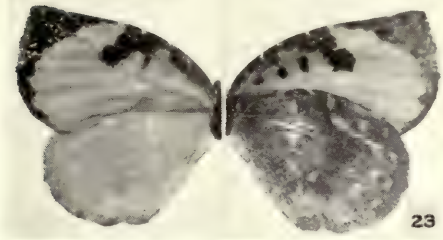
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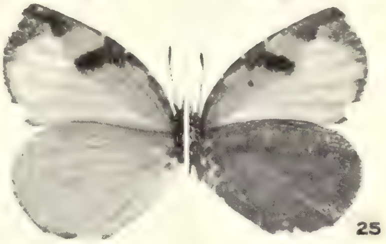
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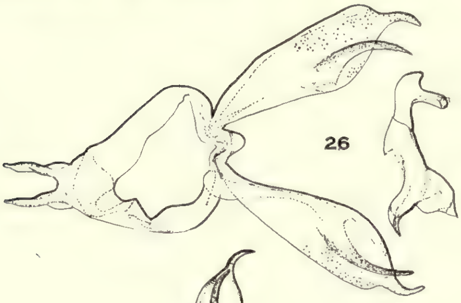
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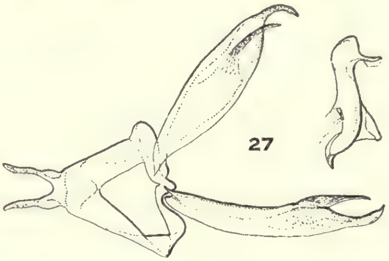
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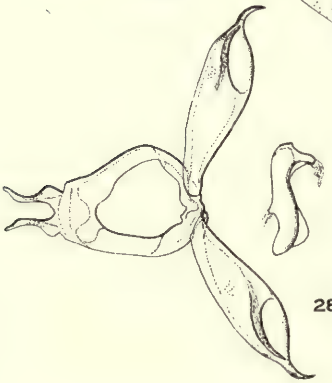
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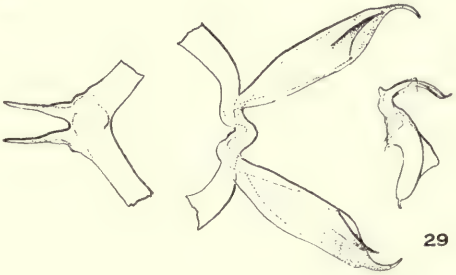
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PLATE 5

(22) *Baliochila singularis*, allotype ♀. (23) *Cnodontes* (gen. nov.) *pallida* Trimen, neallotype ♀. (24) *Cnodontes vansomereni* sp. nov., holotype ♂. (25) *Cnodontes vansomereni* allotype ♀. (26) *Teriomima subpunctata* Kirby, ♂ genitalia (aedoeagus detached). (27) *Teriomima puella* Kirby, ♂ genitalia (aedoeagus detached). (28) *Teriomima zuluana* van Son, ♂ genitalia (aedoeagus detached). (29) *Teriomima puellaris* Trimen, ♂ genitalia (uncus and aedoeagus detached).

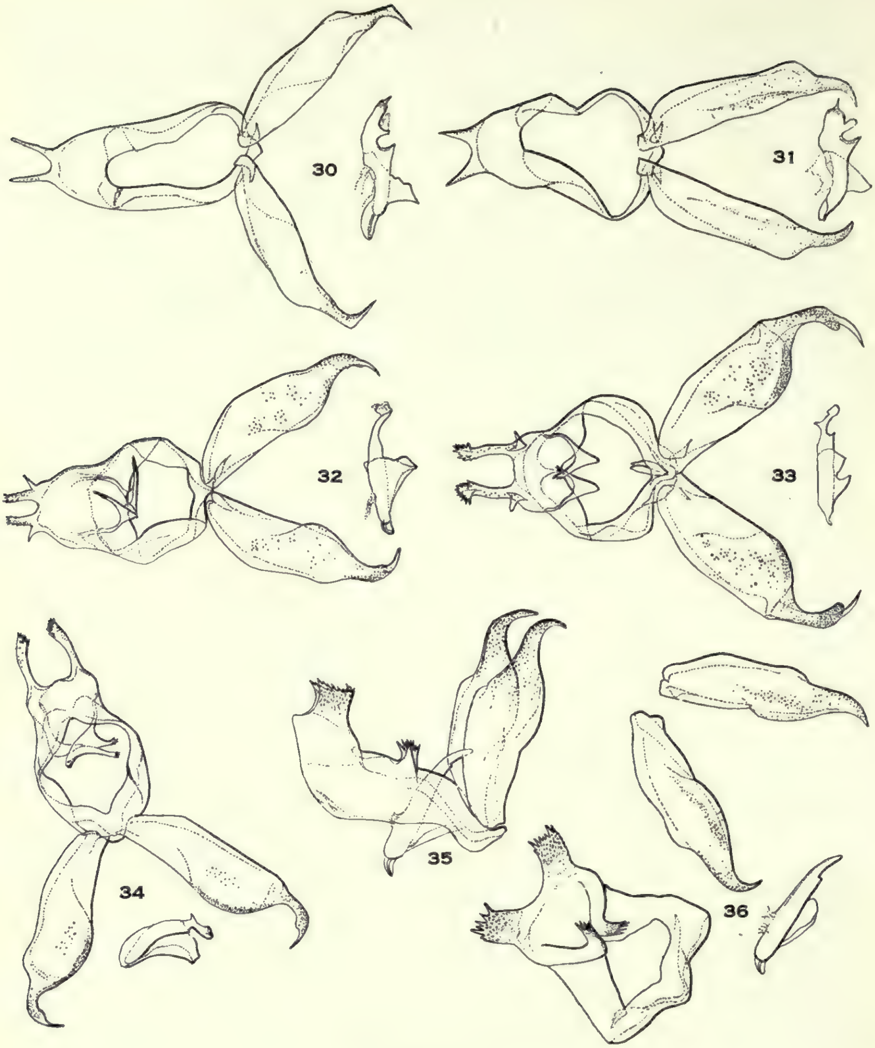
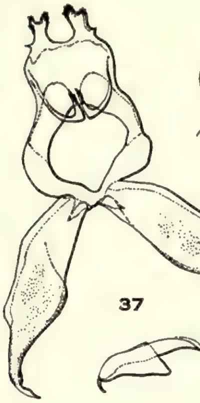


PLATE 6

(30) *Teriomima micra* Grose Smith, ♂ genitalia (aedoeagus detached). (31) *Teriomima parva* Hawker Smith, ♂ genitalia (aedoeagus detached). (32) *Baliochila* (gen. nov.) *aslauga* Trimen, ♂ genitalia (aedoeagus detached). (33) *Baliochila barnesi* sp. nov., ♂ genitalia (aedoeagus detached). (34) *Baliochila neavei* sp. nov., ♂ genitalia (aedoeagus detached). (35) *Baliochila hildegarda* Kirby, ♂ genitalia (lateral aspect). (36) *Baliochila hildegarda* Kirby, ♂ genitalia (aedoeagus detached).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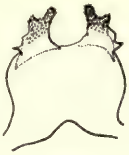
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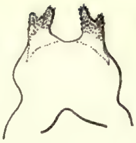
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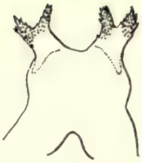
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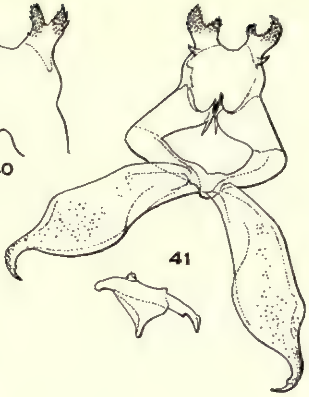
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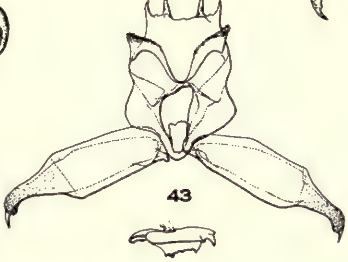
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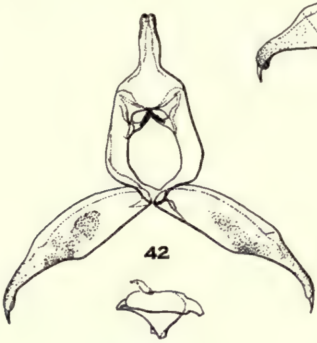
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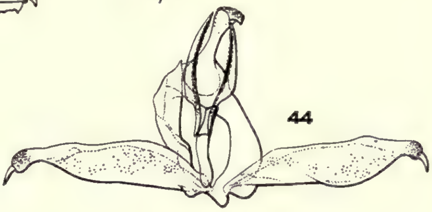
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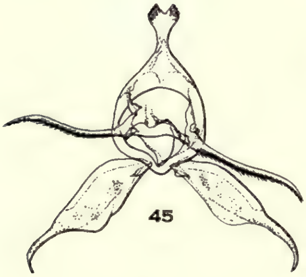
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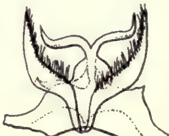
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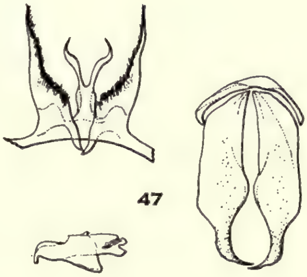
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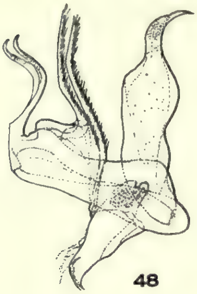
PLATE 7

(37) *Baliochila dubiosa* sp. nov., genitalia of holotype ♂ (aedoeagus detached). (38 *B. dubiosa*, uncus (Kilifi, Kenya). (39) *B. dubiosa*, uncus (Kilifi, Kenya). (40) *B. dubiosa*, uncus (Meru, Kenya). (41) *B. dubiosa*, ♂ genitalia (aedoeagus detached). (42) *Baliochila nyasae* sp. nov., ♂ genitalia (aedoeagus detached). (43) *Baliochila stygia* Talbot, ♂ genitalia (aedoeagus detached). (44) *Baliochila woodi* Riley, ♂ genitalia. (45) *Baliochila fragilis* sp. nov., ♂ genitalia. (46) *Baliochila minima minima* Hawker Smith, uncus and special processes. (47) *Baliochila minima latimarginata* Hawker Smith, ♂ genitalia (valvae and aedoeagus detached).



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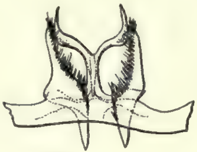

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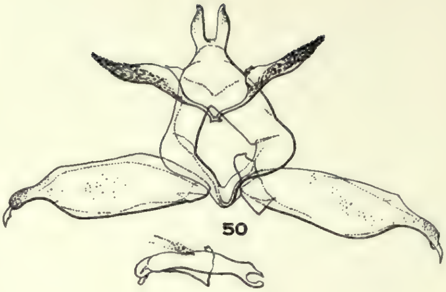

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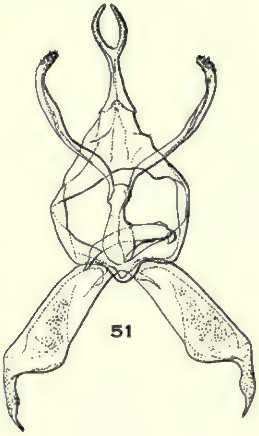

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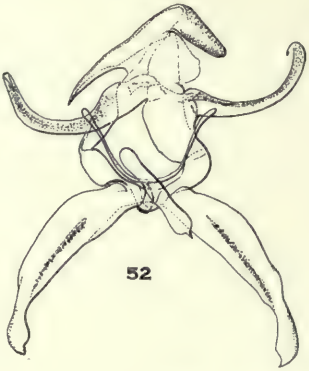

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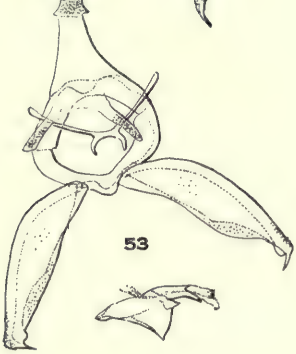

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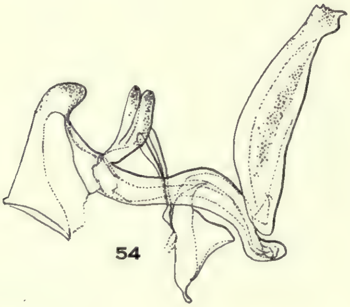

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PLATE 8

(48) *Baliochila minima latimarginata* Hawker Smith, ♂ genitalia (lateral aspect). (49) *Baliochila minima amanica* ssp. nov., uncus and special processes. (50) *Baliochila lipara* sp. nov., ♂ genitalia (aedoeagus detached). (51) *Baliochila singularis* sp. nov., ♂ genitalia. (52) *Cnodontes* (gen. nov.) *pallida* Trimen, ♂ genitalia. (53) *Cnodontes vansomereni* sp. nov. ♂ genitalia (aedoeagus detached). (54) *Cnodontes vansomereni* sp. nov., ♂ genitalia (lateral aspect).

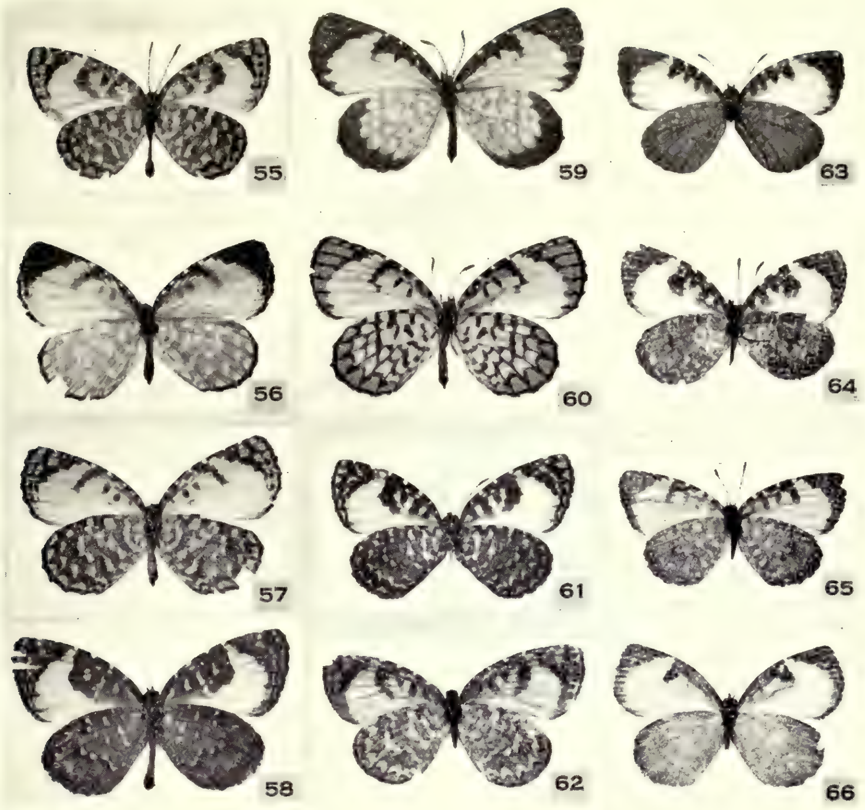

PLATE 9

(55) *Baliochila hildegarda* Kirby, Mombasa, ♂ underside. (56) *B. hildegarda* Kirby, Mombasa, ♀ upperside. (57) Underside of fig. 56. (58) *B. hildegarda* Kirby. Sagalla, B.E.A., ♂ underside (heavily marked form). (59) *B. hildegarda* Kirby, Fort Jamieson, N.E. Rhodesia, ♀ upperside (heavily marked form). (60) Underside of fig. 59. (61) *Baliochila dubiosa* sp. nov., nr. Mombasa, 30 m. N.W. of Rabai, ♂ underside. (62) *B. dubiosa* sp. nov., Kilifi, Kenya, ♂ underside. (63) *B. dubiosa* sp. nov., Nairobi, Kenya, ♂ underside. (64) *B. dubiosa* sp. nov., Meru, Tanganyika, ♂ underside. (65) *Baliochila neavei* sp. nov., Gorongoza, Mozambique ♂ underside. (66) *Cnodontes vansomereni* gen. et sp. nov., Katanga, R. Lupweshi, ♂ underside.

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(HYM., ICHNEUMONIDAE)

J. F. PERKINS

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NOTES ON BRITISH ICHNEUMONINAE WITH DESCRIPTIONS OF NEW SPECIES (HYM., ICHNEUMONIDAE)

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SYNOPSIS

The paper deals with the British species of Ichneumoninae to be added to, and deleted from the list given by Kloet and Hincks in their *Check List of British Insects*. Two genera and sixteen species are described as new and three new names are proposed. In all, 110 trivial names are deleted from the list and 105 are added ; this includes changes due to direct synonymy. Some new synonymy is included. Finally a new check list of British Ichneumoninae is given.

INTRODUCTION

THE present paper was written in order to clear the way for a handbook on the British species of Ichneumoninae. I have therefore given almost no notes on the characters for distinguishing the species which are added to the British list of Ichneumoninae as given in Kloet and Hincks (1945), as these will appear in the keys in the handbook. I have, however, given some information on certain of the species that I consider should be excluded from the British list, where these have a wider interest.

I have been much aided in this work by the very kind co-operation of many workers who have sent me material and given me information. I wish to thank the Director of the Institut Royal des Sciences Naturelles de Belgique for allowing me the opportunity of examining the Wesmael collection, and Mons. A. Collart for the facilities he placed at my disposal; the officials of the Linnean Society for allowing me to examine certain Linnean types; Mr. E. A. Ellis of the Castle Museum, Norwich, for the loan of the Bridgman collection of Ichneumoninae; the officers of the Suffolk Naturalists who presented the Morley types of Ichneumonidae to the British Museum and who have lent me the Morley collection of Ichneumonidae; Mr. A. A. Cumming of the City Museum and Art Gallery, Plymouth, for allowing me to examine and borrow material from the Bignell collection; Mr. H. C. S. Halton of the Natural History Museum, Wollaton Hall, Nottingham, for facilities to examine, and to borrow, types and material from the L. A. Carr collection of Ichneumonidae; Miss G. Roche of the National Museum of Ireland for the loan of specimens from the Johnson collection; Prof. C. H. Lindroth of the Lund University Museum for the loan of specimens from the Thomson collection; Mr. A. W. Stelfox for the loan of his collection of Phaeogenini; Dr. O. W. Richards for the loan of his collection of Ichneumoninae; Dr. W. D. Hincks for the loan of material of Platylabini; and Mr. G. J. Kerrich and Mr. G. Heinrich for information on various points, including types.

Throughout the paper names which are given after an equals sign are the valid names, while those given after syn. are synonyms.

References to original descriptions are not quoted in the text, but they can be found by consulting Dalla Torre (1902), Morley (1903) and Schmiedeknecht (1902 and 1928–1932); references to species described after 1932 will be found in section XIII at the end of the paper.

I. NOTES ON THE LINNEAN TYPES OF ICHNEUMONINAE

Roman (1932) has discussed the Linnean types of Ichneumonidae, but more recent work has made it necessary to re-assess certain of them, and the results are given below, in so far as they affect the British list of Ichneumoninae.

Ichneumon fossorius L., 1758

= *Amblyteles fossorius* (L., 1758).

syn. *Amblyteles viridatorius* (Gravenhorst, 1820). **(*syn. nov.*)**

Roman has synonymized *fossorius* with *Amblyteles subsericans* (Gravenhorst). The type of *fossorius* is a male, and this can be distinguished at once from *subsericans* by the ventral fold on the sternites. The Linnean specimen has a fold on sternites 2–4. I have seen no specimen of *Amblyteles fossorius* (L.) from the British Isles.

Ichneumon molitorius L., 1761.

Roman suggested that the Linnean species belonged to the form described as *crassifemur* by Thomson. However, I regard *crassifemur* as being a species distinct from *molitorius* L. Thomson, distinguished not only in the characters of the hind leg given by Thomson, but also in having the groove on the underside of the middle femur with only very sparse hairs. The Linnean specimen agrees with Thomson's interpretation of *molitorius*. I have examined type material of *crassifemur* from the Thomson collection.

Ichneumon comitator L., 1758.

= *Coelichneumon comitator* (L., 1758).

syn. *Ichneumon restaurator* F. Wesmael, 1844.
Ichneumon lineator F. Gravenhorst, 1820, *nec* F., 1781.
Ichneumon ferreus Gravenhorst, 1829.

I regard *Ichneumon ferreus* as the form of *C. comitator* with the femora and tibiae red, but distinct from *Coelichneumon purpurissatus* (see p. 138).

II. THE STEPHENS TYPES OF ICHNEUMONINAE

I have re-examined the types of Stephens that had already been selected by Claude Morley (see Morley, 1902), and also I have been able to recognize further types which previously had remained unknown. I am therefore giving a complete list of the species of this sub-family described by Stephens in 1835 in his *Illustrations of British Entomology ; or a synopsis of Indigenous Insects :* Mandibulata, **7** : 126–207 and 269–273.

The following changes of nomenclature are necessary :

Coelichneumon nigerrimus (Stephens, 1835) for *Coelichneumon derasus* (Wesmael, 1844).
Cratichneumon albifrons (Stephens, 1835) for *Cratichneumon gravenhorstii* (Boyer de Fonscolombe, 1847).
Cratichneumon fabricator maculifrons (Stephens, 1835) for this British sub-species.
Coelichneumon eximius (Stephens, 1835) for *Coelichneumon coeruleus* (Cresson, 1864).

The notes on the types of *Ichneumon* and *Trogus* are given in the order in which the species are placed in Stephens' work.

Ichneumon fasciatus

Type Hym. 3b 1580 ♂ selected by Morley.
= *Hepiopelmus leucostigmus* (Gravenhorst, 1820).
The same specimen is the type of *Ichneumon maculiventris* Desvignes.

Ichneumon nigerrimus

Type Hym. 3b 1721 ♂ selected by Morley.
= *Coelichneumon nigerrimus* (Stephens, 1835).

syn. *Coelichneumon derasus* (Wesmael, 1844). (***syn. nov.***)

This name is not now invalidated by *Ichneumon nigerrimus* (Scopoli). (= *Sphex nigerrimus* Scopoli = *Anoplius nigerrimus* (Scopoli)).

Ichneumon compunctor

Type Hym. 3b 1814 ♂ selected by Morley.
= *Ichneumon cessator* Mueller, 1776.

Ichneumon rufipes

Type Hym. 3b 1582 ♂ selected by Morley.
= *Polytribax curvus* (Schrank, 1802). ***(syn. nov.) (comb. nov.)***

syn. *Ichneumon curvus* Schrank, 1802.
Cryptus rufipes Gravenhorst, 1829.
Phygadeuon curvus (Schrank) ; Gravenhorst, 1829.
Plectocryptus curvus (Schrank) ; Thomson, 1873 and 1874.
Microcyptus curvus (Schrank) ; Thomson, 1883.
Mesocryptus (lapsus for *Microcryptus*) *curvus* (Schrank) ; Thomson, 1897.
Plectocryptus curvus (Schrank) ; Schmiedeknecht, 1905.

Confusion has been caused in the interpretation of this species by the fact that one specimen from Stephens' collection (not the type) has the head and thorax of *Polytribax curvus* male, and on to this has been glued the abdomen of a female *Eurylabus torvus* Wesmael. The species with oval spiracles which were placed in *Microcryptus* by Thomson (1883) and the related species which were placed by Schmiedeknecht in *Plectocryptus* are congeneric with the North American species of *Polytribax*.

Ichneumon maculifrons

No type.
= *Cratichneumon fabricator maculifrons* (Stephens, 1835).

The specimen selected by Morley as the type has the hind femur red and thus does not agree with the original description, but from the description this species is most probably *Cratichneumon fabricator* (F.) as stated by Morley, and I propose to use this name for the British subspecies of *fabricator*. The specimen which Morley selected, however, does belong to the same subspecies.

Ichneumon maculicornis

Type Hym. 3b 1585 ♀ selected by Morley.
= *Phaeogenes maculicornis* (Stephens, 1835).

syn. *Phaeogenes scutellaris* Wesmael, 1844.

Ichneumon cognatus

No type. ♂. Given as a synonym of *Amblyteles subsericans* (Gravenhorst, 1820) by Desvignes (1856). Males of this species as well as of the closely related *A. elongatus* Brischke are present in the Stephens collection.

Ichneumon crassicornis Stephens *nec* Rossi, 1794.

Type Hym. 3b 1725 ♂ selected by Morley.
= *Probolus concinnus* Wesmael, 1853.

Ichneumon femorator

Type Hym. 3b 1581 ♂ selected by Morley.
= *Probolus culpatorius* (L., 1758).

syn. *Probolus alticola* (Gravenhorst, 1820).

Ichneumon fulvipes

No. type. Given as a synonym of *annulator* F., 1793 (= *culex* Mueller, 1776) by Desvignes (1856). This agrees with the description.

Ichneumon albifrons

Type Hym. 3b 1565 ♂ selected by Morley.
= *Cratichneumon albifrons* (Stephens, 1835).

syn. *Ichneumon gravenhorstii* Boyer de Fonscolombe, 1847, *nec* Wesmael, 1836, *nec* Guérin-Méneville,1838. (***syn. nov.***)

It is not conspecific with *Ichneumon impugnator* Wesmael, of which I have examined the syntypes, which has a conspicuously longer malar space.

Ichneumon binotatus

No type.
= *Stenichneumon lineator* (F., 1781). (***syn. nov.***).

Given as a synonym of *Ichneumon leucomelas* Gmelin (= *Barichneumon albilineatus* (Gravenhorst) by Desvignes, but the description cannot refer to that species. The male of *Stenichneumon lineator* (F.) agrees with the description and I regard *binotatus* as a synonym of this species.

Ichneumon bipunctorius

No type. Not given by Desvignes (1856). From the description = *Barichneumon albilineatus* (Gravenhorst, 1820).

Ichneumon cingulipes

Type Hym. 3b 1576 ♀ selected by Morley.
= *Amblyteles oratorius* (F., 1793).

Ichneumon microcephalus

Type Hym. 3b 1579 ♂ selected by Morley.
= *Ichneumon formosus* Gravenhorst, 1829. ***(syn. nov.)***

I follow Wesmael, who examined the type of *formosus*, in the synonymy of *I. obsessor* Wesmael with that species.

Ichneumon fulvoscutellatus

No type. The description obviously refers to a discoloured specimen, and since this was obtained in May, most probably to a species of *Ichneumon* that had hibernated. I have been unable to determine the species from the description. Morley has suggested that the name is a synonym of *I. terminatorius* Gravenhorst.

Ichneumon quadrinotatus

No type. The specimen which had been selected as the type by Morley is from the Desvignes collection. However, there seems no doubt that the species is a synonym of *I. gracilicornis* Gravenhorst, as given by Desvignes (1856).

Ichneumon concinnatorius

No type.
= *Ichneumon terminatorius* Gravenhorst, 1820.

Ichneumon dimidiatus

Type Hym. 3b 1574 ♀ selected by Morley.
= *Amblyteles pallidicornis* (Gravenhorst, 1829).

Ichneumon diversorius

No type.
= *Amblyteles armatorius* (Forster, 1771). ♀.
Not quoted by Desvignes (1856).

Ichneumon triangulator

No type.
= *Amblyteles trifasciatus* (Gravenhorst, 1829) *teste* Morley.
Not given by Desvignes (1856).

Ichneumon eximius

Type Hym. 3b 1817 ♀ selected by Perkins.
= *Coelichneumon eximius* (Stephens, 1835).

syn. *Coelichneumon coeruleus* (Cresson, 1864). **(*syn. nov.*)**

There is a female of the North American *Coelichneumon coeruleus* from the Stephens collection bearing a label in the writing of F. Smith saying that it stood in the Stephens British collection. This specimen agrees entirely with Stephens' description and it thus seems certain that it is in fact the type of *eximius*.

Ichneumon erythrogaster Stephens *nec* Gmelin, 1790.

Type Hym. 3b 1720 ♀ selected by Morley.
= *Protichneumon coqueberti* (Wesmael, 1848).

Ichneumon melanopyrrhus

Type Hym. 3b 1815 ♂ selected by Perkins.
= *Coelichneumon orbitator* (Thunberg, 1822). ***(syn. nov.)***
syn. *Coelichneumon liocnemis* (Thomson, 1888).

Morley has synonymized this species with *Coelichneumon castaneiventris* (Gravenhorst), but I have seen no specimens of that species from Britain with the hind femur and tibia red, as is given in the original description of *melanopyrrhus*.

Except that Stephens does not mention the small white marks on the thorax, there would be no doubt that the species here described was *C. orbitator*. However, the single male of *orbitator* from the Stephens collection has the thorax covered in dirt and these marks obscured and, moreover, has the apex of the 3rd tergite red and the base of the 4th tergite black as given in Stephens' original description. I have therefore no doubt that this was the specimen that Stephens was describing and have selected it as the type.

Roman (1912) synonymized *C. liocnemis* (Thomson) with *I. orbitator* Thunberg; in 1914 he synonymized *I. ruficauda* Wesmael with this species, but *ruficauda*, of which I have seen the type series, is completely distinct. As Thunberg states that the legs are red, I have accepted Roman's synonymy of *orbitator* with *liocnemis*, *ruficauda* having legs for the most part black in the specimens I have examined.

Ichneumon castanopyga

Type Hym. 3b 1577 ♀ selected by Morley.
= *Amblyteles castanopyga* (Stephens, 1835).
syn. *Amblyteles rubriventris* Wesmael, 1854.

Ichneumon pyrrhopus

No type.
= *Cratichneumon fabricator maculifrons* (Stephens, 1835). ***(syn. nov.)***

This species has been synonymized with *Cratichneumon fugitivus* (Gravenhorst), but from the description it is unlikely to be that species, as I have never seen a specimen of *fugitivus* with red hind femora. However, the earlier authors mixed this species with the forms of *fabricator* with a red abdomen, and it is most probable that the Stephens species is a synonym of *C. fabricator maculifrons* (Stephens).

Ichneumon gasterator

Type Hym. 3b 1567 ♀ selected by Morley.
= *Cratichneumon corruscator* (L., 1758).

In the Stephens collection there is also a specimen of *C. fugitivus* (Gravenhorst) labelled as *gasterator*; this no doubt is the form mentioned by Stephens with "posterior tibiae sometimes pitchy at apex, and reddish at the base."

Ichneumon femorator

Type Hym. 3b 1581 ♀ selected by Morley.
= *Colpognathus celerator* (Gravenhorst, 1807).

Ichneumon rufator

Type Hym. 3b 1698 ♂ selected by Morley.
= *Phaeogenes semivulpinus* (Gravenhorst, 1829). ***(syn. nov.)***

Ichneumon abdominator

Type Hym. 3b 1816 ♀ selected by Perkins.
= *Diadromus troglodytes* (Gravenhorst, 1829). ***(syn. nov.)***

The specimen was unlabelled as to species but had a label "New species" in Smith's handwriting. It is a peculiarly coloured specimen of *troglodytes* agreeing with Stephens' description.

Ichneumon picipes

No type. I have been unable to recognize this species from the description, though most probably it is a female *Phaeogenes*.

Ichneumon ruficollis

No type.
= *Barichneumon sanguinator* (Rossi, 1794).
This synonymy was given by Desvignes (1856).

Ichneumon rufescens

Type Hym. 3b 1564 ♀ selected by Morley.
= *Aoplus ratzeburgii* (Hartig, 1838).
syn. *Stenichneumon pictus* (Gravenhorst) Morley.

Ichneumon cinctorius Stephens *nec* Fabricius 1775

Type Hym. 3b 1813 ♂ selected by Perkins.
= *Amblyteles indocilis* Wesmael, 1844.

This type was not previously indicated. Morley (1902) attributes the species to Desvignes (who only re-described it), and selected a so-called type from the latter's collection. The two specimens are, however, conspecific.

Trogus atrocaudatus

No type. From the description = *Callajoppa cirrogastra* (Schrank, 1781). I have never seen a British specimen of *C. exaltatoria* (with which Morley synonymised it) in which the 4th tergite is testaceous.

Trogus dissimilator

No type. From the description = *Ichneumon didymus* Gravenhorst, 1829 (syn. *bisignatus* Gravenhorst), as suggested by Morley.

III. THE DESVIGNES TYPES OF ICHNEUMONINAE

Morley (1902) has given some notes on the Desvignes types, and all those types, which are in the British Museum, were selected by him. Heinrich (1937) has given further information on them. However, there were various problems left outstanding and it has now been possible to re-assess these. I have therefore included a complete list of the Desvignes types. The following names are at present valid:

Platylabus obator (Desvignes, 1856).
syn. *Ichneumon obator* Desvignes, 1856.

Ichneumon lautatorius Desvignes, 1856.

Ichneumon minutorius Desvignes, 1856.
syn. *I. captorius* Thomson, 1887. (***syn. nov.***)

Chasmias paludator (Desvignes, 1854.)
syn. *Chasmodes paludicola* Wesmael, 1857.

In the list of types which follows all but the last two species were described by Desvignes in 1856 in the *Catalogue of the British Ichneumonidae in the British Museum.*

Ichneumon maculiventris

Type Hym. 3b 1580, ♀.
= *Hepiopelmus leucostigmus* (Gravenhorst, 1820).
This specimen is also the type of *Ichneumon fasciatus* Stephens.

Ichneumon obator

Type Hym. 3b 1583, ♂.
= *Platylabus obator* (Desvignes, 1856).
This is a distinct species and not a synonym of *P. pedatorius* (F.). It differs from *pedatorius* in having the epicnemia strongly raised on each side of the middle line, the distance between thyridiae : breadth of a thyridia = 1 : at most 1·5; stigma black, hind femur black apically and segment 1 of hind tarsus sub-equal to segments 2 + 3 + 4. I have taken it abundantly in June, flying around *Galium* in hedgerows.

Ichneumon crassorius

Type Hym. 3b 1693, ♂.
= *Ichneumon didymus* Gravenhorst, 1829. (Heinrich, 1937).
I. inquinatus Wesmael (syn. *brevigena* Thomson) which Morley considered as conspecific with *I. crassorius*, is a completely distinct species.

Ichneumon relucens

Type Hym. 3b 1573, ♀.
= *Amblyteles indocilis* Wesmael, 1844.

Ichneumon cubicularis

Type Hym. 3b 1571, ♀.
= *Amblyteles fabricii* (Schrank, 1802).
syn. *Amblyteles truncicola* Thomson, 1888. (***syn. nov.***)

Ichneumon lautatorius

I have examined the type in the Curtis collection.

Ichneumon ancipterus

Type Hym. 3b 1722, ♂.
= *Amblyteles palliatorius* (Gravenhorst, 1829.) ***(syn. nov.)***

Ichneumon dubitatus

Type Hym. 3b 1572, ♂.
= *Amblyteles palliatorius* (Gravenhorst, 1829). ***(syn. nov.)***

Ichneumon flavocinctus

Type Hym. 3b 1570, ♂.
= *Ctenichneumon panzeri* (Wesmael, 1844). (Heinrich, 1937).

Ichneumon minutorius

Type Hym. 3b 1702, ♂.
syn. *Ichneumon captorius* Thomson, 1887.

The female of this species was recorded erroneously as *rufidens* Wesmael by Desvignes. It is one of the species that was formerly lumped under "*Ichneumon raptorius*." I have examined 9 female and 2 male syntypes of *captorius* from the Thomson collection.

Ichneumon binotatus

Type Hym. 3b 1566, ♂.
= *Cratichneumon corruscator* (L., 1758).

Ichneumon niveatus

Type Hym. 3b 1690, ♂.
= *Aptesis arridens* (Gravenhorst, 1829).

Ichneumon cinctorius

This species was described by Stephens (1835). It has been attributed to Desvignes by Morley (1902), but Desvignes only re-described it. The name is a primary homonym and the species is *Amblyteles indocilis* Wesmael.

Ichneumon rubedinis

Type Hym. 3b 1569, ♀.
= *Ichneumon walkeri* Wesmael, 1848. ***(syn. nov.)***

This species is distinct from *I. vulneratorius* Zetterstedt, 1838 (syn. *dahlbomi* Wesmael), differing from it in having a weak but distinct scopa on the hind coxa, the central area of the post-petiole strongly and rather evenly, longitudinally striate, and the clypeus with coarse, widely spaced punctures. I am unable to distinguish *I. polyonomus* Wesmael, 1859, from *walkeri* except in colour and these probably represent only northern and alpine subspecies.

Hoplismenus semirufus

Type missing.
= *Platylabops apricus* (Gravenhorst, 1820). (Heinrich, 1937).

Ichneumon paludator

Desvignes, 1854, *Trans. R. ent. Soc. Lond.* n.s. **3** : 44.

Type Hym. 3b 1723, ♀.
= *Chasmias paludator* (Desvignes, 1854).
syn. *Chasmodes paludicola* (Wesmael, 1857). (Heinrich, 1937).

Ichneumon cambriensis

Desvignes, 1867, *Ent. mon. Mag.* **4** : 130.

Type Hym. 3b 1602, ♂.
= *Phaeogenes stipator* Wesmael, 1855.

IV. TYPES OF BRITISH ICHNEUMONINAE IN THE BRIDGMAN, MORLEY AND MARSHALL COLLECTIONS

The Bridgman and Morley types, for the most part, have not been examined by other workers. By far the greater number of the names refer to species which had already been described. The following names are at present valid :

Dicaelotus cameroni Bridgman, 1881.

Phaeogenes distinctus (Bridgman, 1887). ***(comb. nov.)***
syn. *Herpestomus distinctus* Bridgman, 1887.

Platylabops pulchellatus (Bridgman, 1889).
syn. *Ichneumon pulchellatus* Bridgman, 1889.

Ichneumon rufidorsatus Bridgman, 1887.

Barichneumon heracleanae (Bridgman, 1884).
syn. *Ichneumon heracleanae* Bridgman, 1884.

Platylabus transversus Bridgman, 1889.
syn. *Platylabus lativentris* Thomson, 1894. (***syn. nov.***)

(a) *The Bridgman Types of Ichneumoninae*

The Bridgman types of Ichneumonidae are in the Castle Museum, Norwich.

Ichneumon pulchellatus Bridgman, 1889

= *Platylabops pulchellatus* (Bridgman, 1889).
This is probably a synonym of *I. eupitheciae* Brischke, 1879.

Ichneumon rufidorsatus Bridgman, 1887

A distinct species, belonging to the genus *Ichneumon* s.s.

Ichneumon heracleanae Bridgman, 1884

= *Barichneumon heracleanae* (Bridgman, 1884).
Closely related to *peregrinator* L., and with this perhaps better placed in a separate genus.

Platylabus transversus Bridgman, 1889

syn. *Platylabus lativentris* Thomson, 1894.

Dicaelotus cameroni Bridgman, 1881

A distinct species of *Dicaelotus*.

Herpestomus striatus Bridgman, 1881

= *Oiorhinus pallipalpis* Wesmael, 1844.

Herpestomus distinctus Bridgman, 1887

= *Phaeogenes distinctus* (Bridgman, 1887).

Diadromus formosus Bridgman, 1881

= *Aethecerus longulus* Wesmael, 1844.

Phaeogenes nitidus Bridgman, 1886

= *Cratichneumon magus* (Wesmael, 1855), ♂. ***(syn. nov.)***

Phaeogenes similis Bridgman, 1881

= *Thyraeella collaris* (Gravenhorst, 1829). ***(syn. nov.)***
This is the form with little red on the thorax.

(b) *The Morley Types of British Ichneumoninae*

Dinotomus spinosus Morley, 1903

Type Hym. 3b 1818, ♂.
= *Hoplismenus bidentatus* (Gmelin, 1790). ***(syn. nov.)***

Ctenichneumon plicatus Morley, 1903

Type Hym. 3b 1819, ♂.
= *Spilichneumon occisorius* (F., 1793).

Nematomicrus elliotti Morley, 1903

Type Hym. 3b 1820, ♀.
= *Eriplatys ardeicollis* (Wesmael, 1844). ***(syn. nov.)***

(c) *The Marshall Type of* Mesostenus maurus.

Mesostenus maurus Marshall, 1873

Type Hym. 3b 1563, ♀.
= *Hoplismenus bidentatus* (Gmelin, 1790). ***(syn. nov.)***

V. THE L. A. CARR COLLECTION OF ICHNEUMONIDAE

Through the kindness of Mr. H. C. S. Halton of the Natural History Museum, Wollaton Hall, Nottingham, I have been able to examine the L. A. Carr collection of Ichneumoninae, and to borrow for study specimens of special interest. In the course of this work it has become clear that specimens of continental origin were mixed with the Lichfield specimens. Under *Protichneumon fuscipennis* (Wesmael) (= *Amblyjoppa fuscipennis*) are a female labelled " Lichfield 1915 *teste* Habermehl " and a male, " Lichfield 1916 *teste* Roman " of the continental form of this species with almost black wings ; in the Harwood collection also were 1 male and 3 females " Lichfield 1917 " and 1 female " Lichfield 1919 " of the same form received from L. A. Carr. This form is abundantly distinct, and in the many specimens of this species that I have seen from the British Isles none has approached this wing colour. There were also normally coloured British specimens in the Carr collection. Under *Ctenichneumon inspector* (Wesmael) were a single pair ; the female agrees completely with two specimens of a very red, central European form of *Ctenichneumon messorius* (Gravenhorst) which were bought by the late D. S. Wilkinson from Schmiedeknecht, and which were also named *inspector* by Schmiedeknecht. I have seen much material of *messorius* from this country, and never any specimens approaching this form in colour ; the male is a specimen of *Amblyteles uniguttatus* (Gravenhorst), a species of which I have seen no British specimens from other collections. Under *Amblyteles uniguttatus* there is a specimen of the ordinary British form of *Ctenichneumon messorius*.

I feel, therefore, that at present it is better to exclude from the British list those species which are included solely on the basis of the Carr collection. It is noteworthy that most of the doubtful specimens are of red forms, whereas in England specimens are most usually darker than central European forms. Up to 1919 Carr used short black pins for pinning his material ; from 1921 to 1923 all are pinned on continental steel pins.

It is of interest to note that the male determined as *Eupalamus lacteator* (Gravenhorst) by Pfankuch is in reality a male of *Cratichneumon clarigator* (Wesmael) ; I have, however, seen material of the true *lacteator* from the British Isles. Otherwise, I have not re-examined the general records from the Carr collection.

The Types of Ichneumoninae in the L. A. Carr Collection

Three species of Ichneumoninae were described from the L. A. Carr collection. All are synonyms.

Cratichneumon fallax Habermehl, 1923

= *Cratichneumon varipes* (Gravenhorst, 1829). ***(syn. nov.)***

syn. *Ichneumon anglicanus* Schmiedeknecht, 1929.

Some of these specimens are a little discoloured by cyanide. *Cratichneumon varipes* stands in the collection under *varipes, fallax* and *magus*.

Barichneumon carri Habermehl, 1923

= *Barichneumon gemellus* (Gravenhorst, 1829). ***(syn. nov.)***

This is rather a dark form, as are most British specimens.

Amblyteles duplicator Roman, 1923

= *Hybophorellus injucundus* (Wesmael, 1854). ***(syn. nov.)***

The type of *duplicator* is a female. There is also a single male of *Hybophorellus injucundus* in the collection. (A number of the very interesting species present in the collection are represented by a single pair.) I have not seen the female type of *injucundus*, which was described from a specimen sent to Wesmael from the Stockholm Museum ; this is described as having the hind legs darker than in the above specimen, but otherwise, in structure and sculpture, agreeing very well. I have seen two other specimens of the male of this species, both from Schmiedeknecht, the one purchased by Wilkinson and the other from the Morley collection.

Hybophorellus injucundus is, of course, quite distinct from *H. aulicus* (Gravenhorst, 1829).

VI. SPECIES TO BE DELETED FROM THE LIST OF BRITISH ICHNEUMONINAE

In the course of revising the British species of Ichneumoninae it has been necessary to re-assess the records of certain of the earlier British authors. No material could be named at all adequately until Wesmael published his *Tentamen dispositionis methodicae Ichneumonum Belgii* in 1844. Prior to that date the descriptions of Ichneumoninae were given with almost no idea of any comparsion of species, and the groupings were based on colour. Wesmael was the first author to divide the subfamily on structural characters, and revolutionized the systematics of the group. The next major advance is found in the works of C. G. Thomson, whose discovery of further structural characters pointed the way to a much sounder appreciation of the group. Unfortunately the workers who immediately followed Thomson made no use of many of the characters that he indicated as of great significance, and the study of the Ichneumoninae continued with the description of great numbers of species, described with the use of a very limited range of characters and with great emphasis on colour. Further, almost no examination of types was undertaken. In recent years Gerd Heinrich, who has correlated many of the European species, genera and tribes with exotic forms, has again made a great contribution to the study of this subfamily.

For myself, I have found it best to base my determination of species, in greater part, on the work of Thomson, together with Wesmael's descriptions. Also Wesmael examined much of the type material of the Gravenhorst species, which are, at the present time, not available for study, and thus the value of his collection is greatly enhanced for research purposes. I was most fortunate in being able to spend a fortnight in Brussels studying the Wesmael collection, which naturally gave me much greater confidence in the interpretation of these species. A point of considerable interest was that in the majority of cases it had been possible to determine the Wesmael species correctly from the published work of Thomson and Wesmael. A certain number of these species I had failed to determine from the keys of Berthoumieu and Schmiedeknecht ; and from the material that has been sent me by other workers, and the determinations that I have seen given by them, I have found that others, too, have experienced the same difficulties.

Desvignes, in 1856, examined the Stephens collection which had come to the British Museum in 1853. It is evident from the labels on certain of the specimens that where Desvignes did not agree with the Stephens determinations, he placed the specimens under the species that he thought correct, and if otherwise unknown to him, he excluded these species from his catalogue. Where I have seen no further specimens of these species in the collections that I have examined, I also propose to exclude them from my consideration of British species. In addition, I propose to exclude those species first recorded by Marshall, the present whereabouts of which is unknown.

Stephens frequently gave descriptions of the other sex of species, drawn from Gravenhorst's description, if he thought that he had recognized one sex of the species. Where it was later shown that Gravenhorst had wrongly associated the sexes, Marshall recorded both names in his list, based on the descriptions given by Stephens. Hence a number of species were brought into the British list for which no British specimens ever existed.

I have only been concerned with those species of which no subsequent material has been obtained. There are a number of species which were incorrectly determined by the earlier authors but of which genuine material has been captured in recent years.

Below are given the names of the 86 species that I consider should now be dropped from the list as given by Kloet and Hincks (1945).

Trogus spinosus Morley, 1903

= *Hoplismenus bidentatus* (Gmelin, 1790).

Hoplismenus bispinatorius (Thunberg, 1822)

The type of this species is conspecific with *H. perniciosus* Gravenhorst, 1829, according to Roman (1912). I follow Thomson in regarding *perniciosus* as distinct from *bidentatus* (Gmelin). It is the latter species which is present in Britain.

Hoplismenus maurus (Marshall, 1873)

= *Hoplismenus bidentatus* (Gmelin, 1790).

Hybophorellus aulicus (Gravenhorst, 1829)

This species was introduced by Marshall, but the location of the specimen on which the record was based is unknown to me. Reference to Wesmael's description of *Amblyteles injucundus* will show that it is not a synonym of *aulicus*. It is described as having the cheeks obliquely striate, and I regard *Amblyteles duplicator* Roman as being a synonym of *injucundus*. I have not seen the types of *injucundus* or *aulicus*. A single male of *Amblyteles injucundus* (Lichfield, 1923 ; *teste* Schmiedeknecht) and the type of *Amblyteles duplicator* Roman (Lichfield, 1922) are in the Carr collection.

Protichneumon fusorius (L., 1761)

This name seems originally to have been included in the British list as the identification of *Amblyjoppa fuscipennis* (Wesmael), and this latter species appears as *fusorius* in the early collections that I have seen and also in the Morley collection. I believe that the inclusion of *similatorius* (F.) by Marshall was due to his thinking this name correct for part of the *fusorius* of British authors. Bignell had a male of *I. primatorius* Forster from Kilmore, Ireland, and a female of *Amblyjoppa fuscipennis, ex Ch. porcellus*, 18.vi.1887 (*J. H. Wood*), under this name. In the Carr collection the single male (1915 ; *teste* Habermehl) and a single female (1916 ; *teste* A. Roman) are specimens of *pisorius* (L.), and it would appear therefore that Carr wrongly transcribed the name.

Although the female of *fusorius* is completely distinct from that of *Amblyjoppa fuscipennis*, the males of these two species are difficult to differentiate. The best characters on which to distinguish them are the form of the lower margin of the mesopleurum which, when viewed dorsolaterally, is more strongly sinuate in *fusorius* than in *fuscipennis*, and the pronotal collar which centrally is sub-equal in length to the distance between the posterior ocelli, whereas in *fuscipennis* it is conspicuously shorter than this distance ; *fusorius* has the ventral fold clearly developed on sternites 2 and 3 of the gaster, whereas in *fuscipennis* it is only clearly developed on sternite 2 ; also the hind tarsus is distinctly infuscate apically in *fusorius*. *P. fusorius* male is of course at once distinguished from the other Western European species of *Protichneumon* in having no ventral plica on sternite 4 of the gaster.

Protichneumon disparis (Poda, 1761)

Stephens recorded this species under *Trogus flavatorius* Gravenhorst, 1829. The species, however, was not included by Desvignes in his catalogue and I also exclude it.

Coelichneumon sugillatorius (L., 1758)

Stephens recorded *C. cyaniventris* (Wesmael, 1858) as this species. The Desvignes specimens and those in the Morley and Bignell collections were also all *cyaniventris.*

Coelichneumon sinister (Wesmael, 1848)

First recorded by Marshall, who included it as being the male which Gravenhorst associated with the female of *leucocerus* and which Wesmael later described as *sinister.* Stephens quoted a description of both male and female of *leucocerus,* and it appears that Marshall included the species on this evidence. The male of *sinister* has the flagellum marked with white centrally ; the female has a scopulate tubercle beneath the hind coxa, and the flagellum not " rolled " apically in dead specimens.

Coelichneumon nothus (Holmgren, 1880)

This is included by Morley (*Brit. Ichs.* **1** : 29) as a variety of *comitator* (L.) (recte *auspex* (Mueller)), but he does not state that he knew of any British specimens of this form.

Coelichneumon periscelis (Wesmael, 1844)

This species was first recorded by Marshall as being the female of the species which Gravenhorst had associated with the male of his *Ichneumon pallifrons.* Stephens gives a description of both sexes of *pallifrons* and it appears that Marshall included the species on this evidence. Specimens that I have seen determined as this species are incorrectly named. That recorded by Morley (*Brit. Ichs.* **1** : 27) from the Bignell collection is a male of *Stenichneumon militarius* (Thunberg) ; it is in fact the specimen that Bignell recorded as *Ichneumon pistorius* Gravenhorst (= *militarius*) from Bickleigh 20.viii.1881.

In addition to the characters given by Wesmael and Thomson for this species, it differs from *desinatorius* (Thunberg, 1822) (syn. *subguttatus* (Gravenhorst, 1829)) in having the gena more weakly and more sparsely punctate and the malar space shorter.

Coelichneumon funebris (Holmgren, 1864)

♀ = *biannulatus* Gravenhorst, 1820, *sec* Thomson.

♂ = *derasus* Wesmael, 1844, *sec* Thomson = *nigerrimus* Stephens (1835).

There has been much confusion in the association of *funebris* (Holmgren) male with its correct female. The specimens that I have seen so named from this country are mostly the males of *Coelichneumon nigerrimus* (Stephens) (e.g., the specimens in the Cambridge Museum cf. Kerrich, 1935, *Trans. Soc. Brit. Ent.*, **2** : 38). The single specimen in the Carr collection (1921 ; *teste* Schmiedeknecht) is a male of *Coelichneumon purpurissatus* Perkins (see p. 138). I accept Thomson's interpretation of *biannulatus,* and this species is unknown to me from the British Isles. Thomson states that the male of *derasus* (Wesmael) stood in several examples under *I. funebris* in Holmgren's collection (Thomson, 1893, *Opusc. ent.* **18** : 1907) ; on the same page he gives notes on the true male of *biannulatus.*

Coelichneumon moestus (Gravenhorst, 1829)

This species was first recorded by Marshall. I have seen no specimens from Britain, and no specimen of it is present either in the Marshall or Fitch collection (the latter collection contains a number of specimens from Marshall).

Coelichneumon puerulus (Kriechbaumer, 1890)

This species was first recorded on a misidentified male of *Barichneumon gemellus* (Gravenhorst) (see Kerrich, 1935, *Trans. Soc. Brit. Ent.* **2** : 38). *C. puerulus* is a species completely unknown to me.

Cratichneumon externus (Berthoumieu, 1895)

The specimen determined as this in the Hancock collection is a female of *Barichneumon deceptor* (Scopoli). *C. externus* is a species completely unknown to me.

Cratichneumon fallax Habermehl, 1923

This is a synonym of *Cratichneumon varipes* (Gravenhorst, 1829).

Cratichneumon dissimilis auctt. angl.

= *Cratichneumon jocularis* (Wesmael, 1848).

The male of *Aoplus ochropis* (Gmelin) has been much confused with this species. In the Johnson collection the specimens from Newcastle, Co. Down were *jocularis*, those from Coolmore, Co. Donegal were *ochropis*.

In the Morley collection are 7♂ *Cratichneumon nigritarius* (Gravenhorst), 2♂ *Cratichneumon försteri* (Wesmael), 2♂ *Aoplus ochropis* and 1♀, The Mound, 8.viii.1900 (*Yerbury*) of *Cratichneumon jocularis*. In the Carr collection was a ♂ *Aoplus ochropis*, Chobham, 19.ix.1891 (*Beaumont*) and 4 ♂ *Cratichneumon nigritarius* (2 *teste* Roman, 1 var. *teste* Habermehl and 1 var. *teste* Pfankuch), all from Lichfield.

There has been much confusion, systematically, between *dissimilis*, which I have not seen from Britain, and *jocularis*. I have followed Wesmael as being the first reviser of *Ichneumon dissimilis* Gravenhorst ; he selected the female, of which he saw the Gravenhorst specimen, as being the type. The male which Gravenhorst associated with *dissimilis* female is *Cratichneumon jocularis* (Wesmael). The two species can be distinguished as follows :

A. ♀. Mesoscutum polished, with at most only a weak indication of microsculpture between the punctures on the disc, the lateral lobes with sparse, shallow, irregularly spaced punctures ; hind coxa, beneath, largely smooth in the apical two-thirds with only a few coarse, scattered punctures ; hind femur and hind tibia with a conspicuous, black, apical mark ; thyridiae a a little narrower.

♂. Face, cheeks (at least on the orbits) and the outer orbits below, yellow ; front coxa and trochanter broadly marked with yellow, middle coxa and trochanter usually with yellow marks ; lateral lobes of the mesoscutum more finely and shallowly punctate than the middle lobe in front of the disc ; hind femur broadly black apically, hind tibia black in apical half ; tarsi black ; antenna with no white band . . . . . . *dissimilis* (Gravenhorst, 1829).

(syn. *Ichneumon citrinops* Wesmael, 1857 ♂ ; *citrinops* Wesmael Kriechbaumer, 1893 ♀♂ ; *zephyrus* Wesmael, 1857 (*sec* Wesmael) ; *dissimilis* Gravenhorst Wesmael, 1859 ♀).

B. ♀. Mesoscutum dull, the punctures of the lateral lobes similar to those of the central lobe before the disc, at least for the greater part coriaceous between the punctures ; hind coxa with the punctures only a little more widely spaced in the apical half than basally ; hind femur and tibia entirely red ; thyridiae a little broader.

♂. Face, and usually the outer orbits below, ivory, the cheeks black ; front coxa and trochanter at most weakly marked with ivory ; middle coxa and trochanter rarely with ivory marks ; lateral lobes of the mesoscutum coarsely punctate, the punctures comparable with those on the middle lobe before the disc ; hind femur weakly, narrowly infuscate at the apex ; hind tibia infuscate at most in apical quarter ; tarsi often, at least in part, pale ; antenna most usually with a white ring . . . . *jocularis* (Wesmael, 1848).

(syn. *Ichneumon dissimilis* Gravenhorst ♂ *nec* ♀, 1829 ; *punctifrons* Holmgren ♂ 1864 ; *dissimilis* Gravenhorst Taschenberg, 1866 ; *dissimilis* Gravenhorst Holmgren ♂♀, 1880 ; *dissimilis* Gravenhorst Kriechbaumer, 1893.)

Eupalamus oscillator Wesmael, 1844

This was first recorded from Bignell's collection ; his 2 females are *Ichneumon didymus* Gravenhorst, without locality. Other British specimens that I have seen determined as *oscillator* have all been *E. wesmaeli* Thomson. *E. oscillator* differs from *wesmaeli* not only in colour, but in the female, in the proportions of the segments of the middle tarsus (Figs. 1 and 2).

Melanichneumon erythraeus (Gravenhorst, 1820)

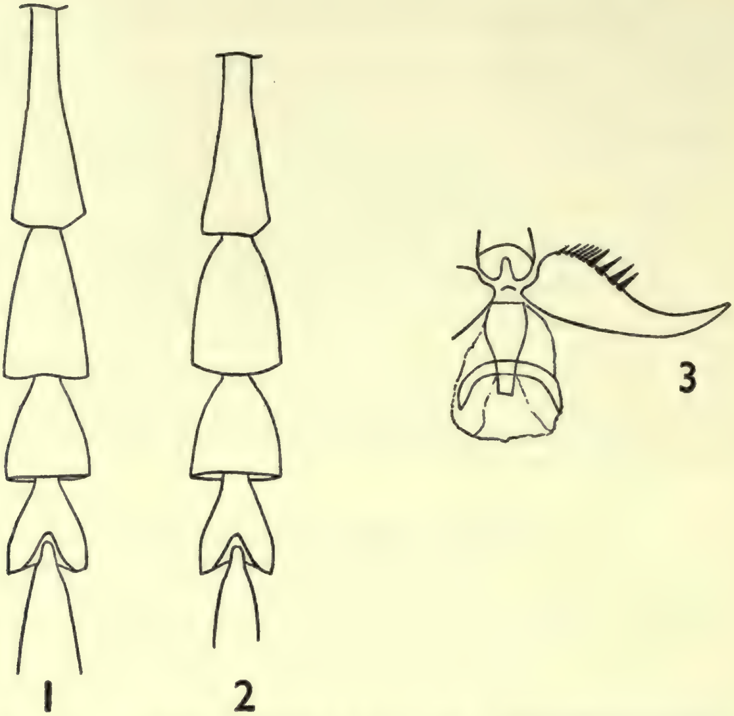
Specimens from Stephens, Morley, Carr and Cambridge Museum collections are all females of *Barichneumon ridibundus* (Gravenhorst). Bignell had 1♀ *Aoplus ochropis* (Gmelin), Plym Bridge, 26.v.1886, and 1♀ *Aoplus ruficeps* (Gravenhorst), Hartlepool (*J. Gardner*), standing under this name. The specimen in the Johnson collection is *Barichneumon sanguinator* (Rossi) (*fide* Stelfox).

The male is immediately distinct from all British species of this group in having the thorax in greater part red. The female, however, might be confused with *sanguinator*, but has the thyridiae broader and the front and middle coxae conspicuously marked with ivory ; in *sanguinator* the coxae are sometimes marked with red or in very small part dirty yellow. It is at once distinguished from *ridibundus* in lacking the tubercle in the pronotal furrow and in having the post-petiole longitudinally striate centrally.

It should be noted that the species recorded under *Melanichneumon* from the British Isles should all be placed in *Barichneumon* according to Heinrich.

Melanichneumon albipictus var. ***obsoletus*** (Berthoumieu, 1895)

The specimen recorded by Johnson (1931, *Ent. mon. Mag.* **67** : 53) is *Barichneumon gemellus* (Gravenhorst). *M. albipictus* is probably better placed in *Stenich-*



Figs. 1–3. Mid tarsal segments 1 to 4: fig. 1, *Eupalamus oscillator*, ♀; fig. 2, *E. wesmaeli*, ♀. Hind claw, fig. 3, *Patroclus sputator*, ♀.

neumon, as at present understood, though the thyridiae are less broad than in other species of that genus.

Barichneumon sexalbatus (Gravenhorst, 1820)

This was recorded by Morley. His specimen from Lyndhurst, Hants, 12.viii.1901 is a male of *Barichneumon coxiglyptus* Heinrich.

Wesmael examined the female type of this species from Piedmont. He states (1859) that he was unable to find any structural difference between this species and *bilunulatus* Gravenhorst, and in fact, that they differed only in the colour of the femora. Wesmael in 1848 (*Bull. Acad. Belg. Cl. Sci.* **15**.i: 182) placed his *derivator* as *bilunulatus* var. 6, but for the present I regard *bilunulatus* as being distinct from *praeceptor* (Thunberg) (syn. *derivator* Wesmael) (cf. Thomson, 1893, *Opusc. ent.* **18**: 1963). In the female, *bilunulatus* has conspicuous spines on the hind tibia which are almost lacking in *praeceptor*. I have not seen the former species from Britain.

Barichneumon bilunulatus auctt. angl.

= *Barichneumon praeceptor* (Thunberg, 1822).

For notes on this species, see above, under *sexalbatus*.

Barichneumon incubitor auctt. angl.

= *Barichneumon coxiglyptus* Heinrich, 1951.

Roman (1932, *Ent. Tidskr.* **53** : 7) pointed out that *Ichneumon incubitor* L. was a *Gambrus*, and the same species as *G. ornatus* (Gravenhorst). *Barichneumon incubitor* auctt. angl. is *Barichneumon coxiglyptus* Heinrich, though *Barichneumon citator* (Thunberg) also occurs in this country. For the differences between these two species see Heinrich (1951, *Bonn. zool. Beitr.* **3–4** : 271).

Barichneumon carri Habermehl, 1923

= *Barichneumon gemellus* (Gravenhorst, 1829).

Barichneumon eupitheciae (Brischke, 1879)

The recorded specimen bred from *Eupithecia helveticaria* by Evans is not present in the Morley collection. From the notes which Morley gives, this specimen was most probably a male of *Cyclolabus pactor* (Wesmael). It is probable that *Ichneumon pulchellatus* Bridgman is a synonym of *I. eupitheciae* Brischke, but the type of the latter requires examination.

Barichneumon angustatus (Wesmael, 1848)

The specimens that I have seen determined as this species have all been males and, for the most part, rather strongly marked specimens of *Barichneumon deceptor* (Scopoli). It seems, originally, to have been introduced to the British list on the strength of the Stephens description of the male of *Ichneumon militaris* Gravenhorst. The male recorded as *angustatus* by Morley is no longer present in his collection. A male in the Johnson collection is *Barichneumon chionomus* (Wesmael). In the Carr collection 2 males *teste* Schmiedeknecht are *Barichneumon deceptor* and 1 male *teste* Habermehl, is *Barichneumon coxiglyptus* Heinrich.

No female has ever been recorded from Britain. This sex is abundantly distinct, with its abdomen strongly narrowed apically and with conspicuous, ivory, apical spots on tergites 4–7, but the male is very similar to *deceptor* ; it differs from that species in having the post-petiole black, rarely reddish at the apex ; the sub-alar callus more rounded and by no means carinate except at the extreme posterior end and usually completely, or almost completely, ivory ; the head a little less narrowed behind the eyes ; mesoscutum a little more shining, with the punctures a little coarser and the interspaces a little wider ; tergites 5–7 with apical, ivory bands or spots.

Ichneumon haesitator Wesmael, 1844

This was originally recorded by Marshall. Stephens quoted the description of both sexes of *Ichneumon latrator* from Gravenhorst. The female of *latrator* Fabricius Gravenhorst is *I. haesitator*, and hence Marshall recorded this species erroneously.

I. haesitator belongs to the *latrator* group and has no ivory spots on the scutellum or on the apical tergites, the vertex with a yellow spot on the orbits, the stigma fuscous, the thyridia conspicuously broader than the distance between the thyridiae, the hind femur black, and the mesoscutum with distinct microsculpture between the punctures and thus dull.

Ichneumon eremitatorius Zetterstedt, 1838

According to Roman, *stigmatorius* Zetterstedt, 1838, which is given by Kloet and Hincks as a synonym of *eremitatorius*, is a synonym of *vulneratorius* Zetterstedt, 1838 ; and *eremitatorius* is the male of *alpestris* Holmgren, 1864. This latter species I have not seen from Britain.

Ichneumon amphibolus Kriechbaumer, 1888

This determination was by A. Roman (Johnson, 1920, *Irish Nat.* **29** : 19–20). No specimen under this name is present in the Johnson collection. It is a species that is completely unknown to me.

Ichneumon quadrialbatus Gravenhorst, 1820

Barichneumon perscrutator (Wesmael) males were determined as this species by Stephens and Desvignes. The male stated to have been bred by Col. Partridge from *Geometra smaragdaria*, in the Morley collection and recorded by him, is an *Exephanes occupator* (Gravenhorst) ; there appears to have been some error in labelling this specimen.

I. quadrialbatus is related to *gracilicornis* Gravenhorst, but in the female has at most a very small, ivory spot on tergite 5, the femora completely red, the tibiae red with the hind tibia infuscate apically, the scutellum strongly convex, tergites 2 and 3 castaneous, most usually marked with black. The male also has the femora completely red, and in the only specimen that I have examined the tergites are completely black. There is a female of this species sent by Gravenhorst to the Linnean Society and now in the British Museum collection.

Ichneumon quaesitorius L., 1761

This species was first introduced by Stephens in his Catalogue where he gave it as *? quaesitorius*. A specimen so labelled from the Stephens collection is a female of *I. gracilentus* Wesmael with tergites 2 and 3 infuscate ; his description in the ' Illustrations ' is taken from Gravenhorst. Marshall wrongly synonymized *Chasmias paludator* (Desvignes) with *Ichneumon quaesitorius* and it was the former species to which he was referring.

I. quaesitorius resembles *primatorius* Forster in structure, but the propodeum is less strongly excised before the dentiparal spines and the post-petiole is coarsely, longitudinally striate ; in colour it is of course completely distinct.

Ichneumon piceatorius Gravenhorst, 1820

This was recorded by Marshall, apparently from the specimen determined as this by Desvignes. It is a male of *Coelichneumon haemorrhoidalis* (Gravenhorst). The identity of *piceatorius* Gravenhorst is still in doubt.

Ichneumon haglundi Holmgren, 1864

Specimens so named from the British Isles are *Ichneumon formosus* Gravenhorst, 1829. I am indebted to Mr. G. J. Kerrich for information concerning the type of *haglundi*.

Ichneumon submarginatus Gravenhorst, 1829

This species was recorded by Stephens but is not included in Desvignes' catalogue. Bignell had placed under this name 1♀, no data, *Eupalamus wesmaeli* Thomson and 1 ♀, Bickleigh, 28.vi.1881, *Stenichneumon militarius* (Thunberg).

This species is related to *nereni* Thomson. In the female the thyridia is distinctly narrower than the distance between the thyridiae, the mesoscutum is closely punctate with microsculpture in the interspaces on the disc, the scutellum is strongly convex and yellow, tergite 2 black or piceous, 3 black, both narrowly red on the apical margin ; tergites 6 and 7 have a yellow, apical spot. I do not know the male of this species.

Ichneumon languidus Wesmael, 1844

Both Marshall and Bridgman determined specimens of *Ichneumon tuberculipes* Wesmael as this species. In the Carr collection the male *teste* Schmiedeknecht is also a specimen of *tuberculipes*, but the one *teste* Habermehl is a male of *Coelichneumon leucocerus* (Gravenhorst).

I. languidus is one of the species with the female having elongate basal flagellar segments, the flagellum strongly attenuate apically, the malar space long, but the area supero-media elongate ; it has no scopulate tubercle on the hind coxa.

Ichneumon rufidens Wesmael, 1844

This in actual fact is a most interesting species with a unidentate mandible and a very large clypeus. Marshall appears to have based his record on a single specimen, so named by Desvignes, which is a female of *Ichneumon minutorius* Desvignes (syn. *captorius* Thomson).

Ichneumon silaceus Gravenhorst, 1829

This was recorded by Stephens but is not in Desvignes' catalogue.

Ichneumon subcylindricus Gravenhorst, 1829

This also was recorded by Stephens but is not in Desvignes' catalogue. I do not know this species, the type of which was re-described by Wesmael (1859).

Ichneumon tempestivus Holmgren, 1864

= *Ichneumon albiger* Wesmael, 1844.

As pointed out by Thomson, *tempestivus* is only the form of *albiger* which has the hind tibia more or less marked with yellow ; this form is common in Britain.

Ichneumon militaris Gravenhorst, 1820

This was recorded by Stephens but is not in Desvignes' catalogue. Specimens so determined by Bridgman belong to the form of *I. extensorius* L. with the hind tibia completely infuscate.

Ichneumon caedator Gravenhorst, 1829

This was recorded by Stephens but is not in Desvignes' catalogue. The single male (Lichfield, 1921 ; *teste* Schmiedeknecht) and female (Lichfield, 1922 ; *teste* Roman) are correctly determined but the record requires confirmation.

Ichneumon gratus Wesmael, 1855

This was recorded by Johnson (1929, *Ent. mon. Mag.* **65** : 135). This specimen is a female of *Chasmias motatorius* (F.).

Ichneumon ??thomsoni Holmgren, 1864

The specimen from Scotland so determined by Roman is a female of *Ichneumon rufidorsatus* Bridgman. For notes on *thomsoni* see Heinrich (1951, *Bonn. zool. Beitr.* **3–4** : 259).

Ichneumon inquinatus Wesmael, 1844

syn. Ichneumon brevigena Thomson, 1886.

Marshall wrongly synonymised *I. crassorius* Desvignes 1856, (= *didymus* Gravenhorst, 1829) with this species. Specimens named *inquinatus* by Morley that I have examined are females of *I. didymus*. The single female in the Carr collection is correctly determined (Lichfield, 1923 ; *teste* Habermehl) ; it is pinned on a Carlsbad pin, other specimens of this date are all on continental steel pins. The record requires confirmation.

Ichneumon multipictus Gravenhorst, 1820

Marshall apparently recorded this species from a specimen determined by Desvignes. It is a female of *Ichneumon exilicornis* Wesmael. The specimens named *multipictus* in the Bignell collection are 2 females of *Ichneumon validicornis* Holmgren, no data, and Cann Wood, 6.iii.1887 (*J. Keys*). The specimen so named in the Carr collection (Lichfield, 1919 ; *teste* Roman) is a female of *Barichneumon lepidus* (Gravenhorst).

Ctenichneumon melanocastaneus auctt. angl.

= *Ctenichneumon rubroater* (Ratzeburg, 1852).

C. rubroater differs from *melanocastaneus* (Gravenhorst) in having the 7th segment of the flagellum quadrate, not elongate and the head with the temples broader and only very weakly converging behind the eyes. *C. melanocastaneus* is probably only a form of *C. repentinus* (Gravenhorst) with a black scutellum (Heinrich, 1929).

Ctenichneumon repentinus auctt. angl.

= *Ctenichneumon devylderi* (Holmgren, 1871).

C. devylderi differs from *repentinus* (Gravenhorst, 1820) in having the spiracles of the 1st tergite much smaller, the length : breadth being at most 1·5 : 1.

Ctenichneumon sputator (F., 1793)

= *Patroclus sputator* (F., 1793). **(comb. nov.)**

This was recorded by Stephens but is not in Desvignes' catalogue. The specimens named *sputator* in the Johnson collection are males of *Stenichneumon culpator* (Schrank). The dark male (Lichfield, 1923; *teste* Schmiedeknecht) in the Carr collection is *Cratichneumon fabricator maculifrons* (Stephens) and the pair of specimens with red-banded abdomen (Lichfield, 1923; *teste* Habermehl) are correct, but I question the provenance of these two specimens.

This species I consider to belong to *Patroclus*, which was originally described from Central America. This genus has the claws with upstanding pectinations, at least basally (Fig. 3); also the 1st tergite of the gaster is strongly raised dorsally at about the line of the spiracles.

Ctenichneumon flavocinctus (Desvignes, 1856)

= *Ctenichneumon panzeri* (Wesmael, 1844).

Amblyteles uniguttatus (Gravenhorst, 1829)

The female of *Ctenichneumon panzeri* (Wesmael) has been misidentified as this on numerous occasions. In the Carr collection are present 1 ♀ *Probolus culpatorius* (L.), 1♀ (*teste* Pfankuch) *Ctenichneumon messorius* (Gravenhorst) and 2♂ (one conspicuously red marked, the other without red markings) (*teste* Schmiedeknecht) which are correctly determined; under *messorius*, Carr has another male of *uniguttatus* (concerning which, see p. 117). The species still requires confirmation as British.

Amblyteles conspurcatus (Gravenhorst, 1829)

This was recorded by Stephens but is not in Desvignes' catalogue. A specimen from the Stephens collection labelled as this is a male of *Ichneumon validicornis* Holmgren.

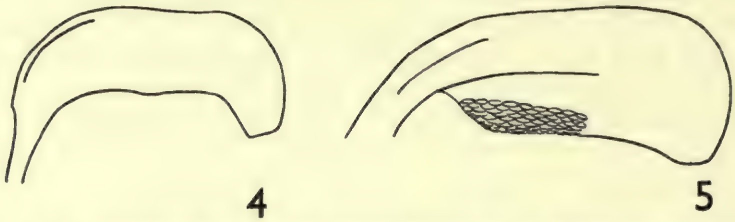
Amblyteles viridatorius (Gravenhorst, 1820)

= *Amblyteles fossorius* (L., 1758).

syn. Amblyteles atratorius (F., 1793).

This was recorded by Stephens but is not in Desvignes' catalogue. A Stephens specimen so labelled is a female of *Amblyteles glaucatorius* (F.). The single pair (*teste* Schmiedeknecht) recorded by Carr as *atratorius* (F.) are a pair of *Amblyteles* (*vadatorius* Illiger 1807) = *pictus* (Schrank, 1776) obviously recorded under *atratorius* due to an error of transcription. Otherwise *Amblyteles quadripunctorius* (Mueller) has been mistaken for this species.

A. fossorius can be distinguished from *quadripunctorius* in the female in that it lacks long spines on the extensor surface of the hind tibia, in having the temples less narrowed behind the eyes and the lower tooth of the mandible minute, as well as in colour ; and in the male in having the ventral plica of the abdomen infuscate, the lower tooth of the mandible minute, the hind femur entirely red, and in the penis valves having no inflated subapical area beneath (Figs. 4 and 5).



FIGS. 4, 5. Lateral view of apex of penis valve : fig. 4, *Amblyteles fossorius* ; fig. 5, *A. quadripunctorius*.

Amblyteles cerinthius (Gravenhorst, 1820)

The specimens so named by Marshall are a pair of *Amblyteles longigena* Thomson. Specimens so named in the Morley collection are also *longigena*. The British specimens do not agree with Gravenhorst's description of *cerinthius*. The species was first introduced to the British list by Stephens, but was deleted by Desvignes ; I have found no specimen so labelled among the Stephens material.

Amblyteles microcephalus (Stephens, 1835)

= *Ichneumon formosus* Gravenhorst, 1829.

Amblyteles duplicator Roman, 1923

= *Hybophorellus injucundus* (Wesmael, 1854). ***(comb. nov.)***

syn. *Amblyteles injucundus* Wesmael, 1854.

The records of these are based on a single male (Lichfield, 1923) (*injucundus*) and a single female (Lichfield, 1922) (*duplicator* type) in the Carr collection. (See under *Hybophorellus aulicus*, above.)

Amblyteles fossorius (L., 1758)

The type of this species has been wrongly determined. It is a male of the species previously known as *Amblyteles viridatorius* (Gravenhorst). (See above.) *Amblyteles fossorius* auctt. angl. = *Amblyteles subsericans* (Gravenhorst, 1820).

Ctenamblyteles homocerus (Wesmael, 1854)

Bignell first recorded this species but his collection now contains no specimen under this name.

Ctenamblyteles is closely related to *Patroclus*. Specimens with dark wings are considered by Heinrich to be the typical form, which has the teeth on the shaft of the claw evenly spaced and large. I have seen a single specimen from the Swiss Alps, which appears to be *homocerus* var. *noskiewiczi* Heinrich, 1926, having almost clear wings and the hind tibia only very narrowly infuscate apically, internally; this form is distinguished from *homocerus* not only in the slight colour difference, but also in having the pectinations on the shaft of the claw thinner and contiguous; when more material can be examined this may well prove to be a distinct species.

Anisobas hostilis (Gravenhorst, 1820)

This was recorded by Stephens but is not in Desvignes' catalogue. Of the specmens recorded by Morley, the one taken by R. C. Bradley in the New Forest is not in Morley's collection, but the one taken by himself is a male of *Barichneumon tergenus* (Gravenhorst). Also under this name in the Morley collection is another male of *tergenus* and 2 females of *Barichneumon gemellus* (Gravenhorst).

Stenolabus daemon (Wesmael, 1844)

= *Asthenolabus daemon* (Wesmael, 1884).

The 2 females (Lichfield, 1921; *teste* Schmiedeknecht) under this name in the Carr collection are *Platylabus concinnus* Thomson. British specimens of *concinnus* are very largely black.

Apaeleticus inclytus Wesmael, 1853

= *Apaeleticus bellicosus* Wesmael, 1844. ***(syn. nov.)***

I have examined the type material of these species in the Wesmael collection.

Eurylabus rufipes (Stephens, 1835)

= *Polytribax curvus* (Schrank, 1802).

Ischnopsidea truncator (F., 1798)

= *Rhexidermus truncator* (F., 1798).

The single female in the Carr collection (Lichfield, 1921; *teste* Habermehl) is correctly determined, but the species requires confirmation as British.

Heterischnus rufipes (Wesmael, 1848)

= *Rhexidermus nigricollis* (Wesmael, 1844). ***(syn. nov.)***

I have examined the type material of these species in the Wesmael collection. *Heterischnus rufipes* auctt. = *Heterischnus pulex* (Mueller, 1776), following Wesmael.

Dicaelotus pusillator (Gravenhorst, 1807)

This was recorded by Marshall. Specimens so named by him are *Epitomus parvus* Thomson, 1891 (syn. *Hemiteles pygmaeus* Brischke, 1890, *nec* Brischke, 1888). The Bignell collection also had *Epitomus parvus* under this name. In the Carr collection are 1 female (Lichfield, 1921; *teste* Habermehl) *Dicaelotus rufoniger* Berthoumieu and 1 female (Lichfield, 1917; *teste* Pfankuch) *Cratichneumon varipes* (Gravenhorst). I have been unable to identify *pusillator* (Gravenhorst) female, which Wesmael placed tentatively in *Dicaelotus* after he had seen the type; the males described by Gravenhorst for this species are mixed; the specimen sent to Wesmael was *Herpestomus arridens* (Gravenhorst).

Dicaelotus rufilimbatus (Gravenhorst, 1820)

I have been unable to satisfy myself as to the identity of this species. Wesmael examined the male type from the Gravenhorst collection, but was uncertain of its identity, though expressing the opinion that it might be the male of *D. erythrostoma* Wesmael. It was recorded by Stephens, but it is not in Desvignes' catalogue.

Colpognathus jucundus Wesmael Thomson, 1891 *nec* Wesmael, 1844.

This was first recorded as *Phaeogenes jucundus* by Marshall. I have seen a specimen so named from his collection and it is *Phaeogenes ischiomelinus* (Gravenhorst). The specimen recorded by Morley from the Piffard collection is a female of *Colpognathus divisus* Thomson. The Bradley specimen quoted by Morley is completely doubtful and has not been traced. The Bignell specimen, Bickleigh, 8.ix.1882, is a female of *Diadromus varicolor* Wesmael.

Ph. jucundus Wesmael, is a true *Phaeogenes* related to *modestus* Wesmael; *montanus* Thomson, is probably a synonym of it.

Centeterus major Wesmael, 1844

The single specimen collected by E. A. Butler, now in the Morley collection, is a male of *Colpognathus divisus* Thomson.

Herpestomus furunculus Wesmael, 1844

= *Herpestomus nasutus* Wesmael, 1844. ***(syn. nov.)***

syn. *Herpestomus intermedius* Wesmael, 1844. (***syn. nov.***)

I have seen the type material of these species; *Herpestomus intermedius* Wesmael I consider also to be a synonym of *nasutus*.

Diadromus guttulatus (Gravenhorst, 1829)

= *Diadromus candidatus* (Gravenhorst, 1829). ***(syn. nov.)***

Diadromus conciliator (Wesmael, 1859)

This was recorded by Marshall, who included it as being the male which Gravenhorst associated with *Ichneumon opprimator* female and which Wesmael later described as *conciliator*. Stephens quoted a description of both male and female of *opprimator*, and it appears that Marshall included the species on this evidence.

Diadromus prosopius Holmgren, 1889

The specimen in the Carr collection (*teste* Habermehl) is a male of *Phaeogenes rusticatus* Wesmael.

Notosemus albibuccus (Kriechbaumer, 1890)

= *Notosemus bohemani* (Wesmael, 1855).

Aethecerus pallicoxa Thomson, 1891

In the Johnson collection the specimen det. Roman as *? pallicoxa* is a male of *Oiorhinus pallipalpis* Wesmael. In the Carr collection are also a pair labelled as *pallicoxa* (*teste* Roman), which are likewise *pallipalpis*.

Mevesia similis (Bridgman, 1881)

= *Thyraeella collaris* (Gravenhorst, 1829).

Baeosemus mitigosus (Gravenhorst, 1829)

syn. *Herpestomus phaeocerus* Wesmael, 1844.

This was recorded by Stephens but is not in Desvignes' catalogue. A specimen so named from the Stephens collection is a female of *Phaeogenes fuscicornis* Wesmael. Gravenhorst recorded *Ph. mitigosus* var. 1 ♂ from Netley, but this, from the description, cannot be conspecific with *mitigosus* and is probably a male *Phaeogenes*.

Phaeogenes nigridens Wesmael, 1844

The Johnson specimen is a male of *Ph. ophthalmicus* Wesmael from Newcastle, Co. Down. In the Carr collection is a specimen labelled "*Ph. ? nigrinus* Berth. *teste* Schmiedeknecht *? nigridens*" which is a female of *Aethecerus discolor* Wesmael.

There has been considerable confusion concerning this species. It is related to *planifrons*, *heterogonus* and *curator*, but differs in the female in having the fore wing with the basal plates infuscate, not yellow ; the hind coxa with a transverse carina beneath which extends to the inner, ventro-lateral margin where it is only slightly raised, and behind this carina the coxa is a little depressed ; the head is more quadrate.

Phaeogenes limatus Wesmael, 1844

= *Phaeogenes fulvitarsis* Wesmael, 1844.

The specimen in the Carr collection (Lichfield, 1923 ; *teste* Schmeideknecht) is a female of *Phaeogenes flavidens* Wesmael. *Ph. limatus* Wesmael Thomson is quite another species which I regard as being conspecific with *Phaeogenes infimus* Wesmael.

Phaeogenes homochlorus Wesmael, 1844

= *Phaeogenes invisor* (Thunberg, 1822). ***(syn. nov.)***

Phaeogenes lascivus Wesmael, 1855

The specimen in the Carr collection (Lichfield, 1921 ; *teste* Schmiedeknecht) is a female of *Phaeogenes fuscicornis* Wesmael.

Phaeogenes minimus Berthoumieu, 1901

The specimen in the Carr collection (Lichfield, 1922 ; *teste* Habermehl) is a female of *Herpestomus nasutus* Wesmael.

Phaeogenes nitidus Bridgman, 1886.

= *Cratichneumon magus* (Wesmael, 1855).

Phaeogenes coryphaeus Wesmael, 1844

This species was first recorded by Bridgman on a specimen that he examined from Champion's collection. There is no specimen of this species in the Bridgman collection nor amongst the Champion material which came to the British Museum. Specimens so named in Johnson's collection are *Ph. fulvitarsis* Wesmael *nec* auctt. (syn. *ruficoxa* Thomson).

The form of the head in *coryphaeus* is quite distinct from the other species of the *fulvitarsis* group, being comparable in shape with *planifrons*, and having the occipital carina about as near to the posterior ocellus as the distance between the posterior ocelli.

Phaeogenes ruficoxa Thomson, 1891

= *Phaeogenes fulvitarsis* Wesmael, 1844, *nec* auctt. ***(syn. nov.)***

The species which has previously been determined as *fulvitarsis* by British authors is *Phaeogenes rusticatus* Wesmael. The species previously determined as *rusticatus* I am describing as a new species.

Phaeogenes minutus Wesmael, 1844

The two specimens in the Carr collection are labelled "Lichfield, 1921 ; *teste* Schmiedeknecht," which is a male of *Oiorhinus pallipalpis* Wesmael, and "Lichfield, 1923 ; *teste* Schmiedeknecht," which is a female of *Phaeogenes ischiomelinus* (Gravenhorst).

The type of this species is in bad condition, but I believe it to be a small female of *infimus* Wesmael.

Phaeogenes ?? acutus (Gravenhorst, 1829)

This species was recorded by Marshall. Specimens so named from his collection are 2 females of *Aethecerus discolor* Wesmael.

Phaeogenes socius Holmgren, 1889

= *Phaeogenes osculator* (Thunberg, 1822), ♂ (*sec* Roman).

The male and female, Lichfield, 1921, in the Carr collection, *teste* Schmiedeknecht, are a pair of *osculator*.

Melanomicrus elliotti Morley, 1903.

= *Eriplatys ardeicollis* (Wesmael, 1844).

VII. SPECIES RECORDED IN THE ADDENDA OF MORLEY'S *BRITISH ICHNEUMONS*

In the Addenda to Morley's *British Ichneumons*, **1** : 292–293, the following species are listed. I have examined the specimens and include my identifications.

Phaeogenes socius Holmgren, 1889, ♀; the Foxall specimen is *Aethecerus nitidus* Wesmael, the Piffard specimen is *Aethecerus discolor* Wesmael.

Phaeogenes macilentus Wesmael, 1844, det. Morley is *Oiorhinus pallipalpis* Wesmael.

Diadromus tenax Wesmael, 1844, det. Morley is *Ischnus nigricollis* Wesmael.

Misetus oculatus Wesmael, 1844, is correct.

Phaeogenes murcifer Holmgren, 1889. I am unable to find this specimen in the Morley collection.

Colpognathus armatus Thomson, 1891, det. Morley is *Colpognathus divisus* Thomson.

VIII. CHANGES IN THE TRIVIAL NAMES OF BRITISH ICHNEUMONINAE

The following changes in specific names due to homonymy and synonymy have to be made :

Trogus pictus (Kriechbaumer, 1882).

= ***Psilomastax pyramidalis*** Tischbein, 1868.

Cercodinotomus Uchida, 1940, type species *Psilomastax pictus* Kriechbaumer, 1882, is a direct synonym of *Psilomastax* Tischbien, 1868, type species *Psilomastax pyramidalis* Tischbein, 1868, the two type species being conspecific. ***(syn. nov.)***

Protichneumon erythrogaster (Stephens, 1835) *nec* (Gmelin, 1790).

= ***Protichneumon coqueberti*** (Wesmael, 1848).

Amblyjoppa laminatoria (Fabricius, 1798).

= ***Amblyjoppa proteus*** (Christ, 1791).

Coelichneumon subguttatus (Gravenhorst, 1829).

= ***Coelichneumon desinatorius*** (Thunberg, 1822).

Coelichneumon derasus (Wesmael, 1844).

= ***Coelichneumon nigerrimus*** (Stephens, 1835).

Stenichneumon trilineatus (Gmelin, 1790).

= ***Stenichneumon lineator*** (Fabricius, 1781).

Platylabus semirufus (Desvignes, 1856).

= ***Platylabops apricus*** (Gravenhorst, 1820).

Cratichneumon gravenhorstii (Boyer de Fonscolombe, 1847) *nec* (Wesmael, 1836) *nec* (Guérin Méneville, 1838).

= ***Cratichneumon albifrons*** (Stephens, 1835).

Cratichneumon liostylus (Thomson, 1887).

= ***Cratichneumon infidus*** (Wesmael, 1848).

Melanichneumon nudicoxa (Thomson, 1888).

= ***Barichneumon digrammus*** (Gravenhorst, 1820).

I have examined a male of *digrammus* sent by Gravenhorst to the Linnean Society and now in the British Museum.

Melanichneumon perscrutator (Wesmael, 1844) *nec* (Thunberg, 1822).
= ***Barichneumon maculicauda nom. nov.***

Melanichneumon albolineatus (Gravenhorst, 1829).
= ***Barichneumon albilineatus*** (Gravenhorst, 1820).

Barichneumon deceptor (Gravenhorst, 1820).
= ***Barichneumon deceptor*** (Scopoli, 1763).

Ichneumon obsessor Wesmael, 1844.
= ***Ichneumon formosus*** Gravenhorst, 1829.

I accept this synonymy, given by Wesmael (1859), after he had examined the Gravenhorst type.

Ichneumon confusorius Gravenhorst, 1829.
= ***Ichneumon confusor*** Gravenhorst, 1820.

Chasmias paludicola (Wesmael, 1857).
= ***Chasmias paludator*** (Desvignes, 1854).

Exephanes hilaris (Gravenhorst, 1829) *nec* (Say, January 1829).
= ***Exephanes ischioxanthus*** (Gravenhorst, 1829).

Amblyteles vadatorius (Illiger, 1807).
= ***Amblyteles pictus*** (Schrank, 1776).

Amblyteles negatorius (Fabricius, 1793).
= ***Amblyteles pulchellus*** (Christ, 1791.) ***(syn. nov.)***

Diadromus rubellus (Gravenhorst, 1829, ♂) *nec* (Gmelin, 1790).
= ***Diadromus quadriguttatus*** (Gravenhorst, 1829).

Epitomus pygmaeus (Brischke, 1890, *nec* 1888).
= ***Epitomus parvus*** Thomson, 1891.

Phaeogenes melanogonus (Gravenhorst, 1820) emend.
= ***Phaeogenes melanogonos*** (Gmelin, 1790).

Phaeogenes scutellaris Wesmael, 1844.
= ***Phaeogenes maculicornis*** (Stephens, 1835).

Phaeogenes tibiator (Thunberg, 1822) *nec* (Gravenhorst, 1820).
= ***Phaeogenes callopus*** Wesmael, 1844.

IX. CHANGES IN GENERIC PLACEMENT OF SPECIES OF BRITISH ICHNEUMONINAE

Protichneumon fuscipennis (Wesmael, 1844) to ***Amblyjoppa*** Cameron, 1902.

Stenichneumon ochropis (Gmelin, 1790), *castaneus* (Gravenhorst, 1820), and *ratzeburgii* (Hartig, 1838) to ***Aoplus*** Tischbein, 1874.

Cratichneumon ruficeps (Gravenhorst, 1829) and *rubricosus* (Holmgren, 1864) to ***Aoplus*** Tischbein, 1874.

The authenticated British species included under *Melanichneumon* Thomson, 1893, to ***Barichneumon*** Thomson, 1893.

Barichneumon magus (Wesmael, 1855) to ***Cratichneumon*** Thomson, 1893.

Barichneumon pulchellatus (Bridgman, 1889) to ***Platylabops*** Heinrich, 1950.

Barichneumon semirufus (Gravenhorst, 1820) to ***Cratichneumon semirufus*** (Gravenhorst, 1820). ***(comb. nov.)***

Barichneumon rufidorsatus (Bridgman, 1887) to ***Ichneumon*** L., 1758.

Barichneumon humilis (Wesmael, 1857) to ***Aoplus*** Tischbein, 1874.

Chasmias lugens (Gravenhorst, 1829) to ***Ichneumon*** L., 1758.

Ctenichneumon haereticus (Wesmael, 1854) to ***Ichneumon*** L., 1758.

Spilichneumon fabricii (Schrank, 1802) to ***Amblyteles*** Wesmael, 1844.

Platylabus rubellus (Gmelin, 1790) and *exhortator* (F., 1787) to ***Ectopius*** Wesmael, 1859.

Platylabus infractorius (L., 1761) to ***Pristiceros*** Gravenhorst, 1829.

Stenolabus Heinrich, 1936, *nec* Schulthess-Rechberg, 1910 = ***Asthenolabus*** Heinrich, 1951.

Eurylabus dirus Wesmael, 1853, to ***Zimmeria*** Heinrich, 1933.

Ischnopsidea Viereck, 1914 = ***Rhexidermus*** Foerster, 1868.

Herpestomus distinctus Bridgman, 1887, to ***Phaeogenes*** Wesmael, 1844.

Proscus cephalotes (Wesmael, 1844) and *suspicax* (Wesmael, 1844) to ***Phaeogenes*** Wesmael, 1844.

X. ADDITIONS TO THE LIST OF BRITISH ICHNEUMONINAE

The list that follows contains those species which have been described previously and of which I have now seen material from Britain. In a few cases these additions are due only to the fact that the majority of the specimens previously determined under certain names were incorrectly identified, and thus a species will have to be deleted at the same time (e.g., *Ichneumon languidus* auctt. angl. for the most part is *Ichneumon tuberculipes* Wesmael and no specimens of *languidus* have been seen from Britain).

Certain species, too, which were formerly given as synonyms, are reintroduced as distinct species, as further material and information concerning them has now been assembled. But allowing for this, some 48 species are added as completely new additions to the list given by Kloet and Hincks, and in all, 65 names are added. These numbers do not include the species described as new later in this paper, nor changes of name due to direct synonymy. I have seen the types or syntypes of species marked with an asterisk.

LISTRODROMINI

Anisobas platystylus Thomson, 1888

ENGLAND: Staffs; Maer Woods, 1♀, 18.vi.1947 (*H. W. Daltry*) det. G. J. Kerrich. (H. W. Daltry Coll.)

PROTICHNEUMONINI

Coelichneumon falsificus (Wesmael, 1844)*

ENGLAND: Essex; Colchester, 1♀, 1910 (*P. Harwood*); Devon; Newton Abbot, 1♀, 27.vi.1935 (*R. C. L. Perkins*). (B.M. Coll.)

Coelichneumon solutus (Homgren, 1864)

SCOTLAND: Inverness; Cairn Gorm, 3000 ft., 1♂, 27.vi.1934 (*R. B.* and *J. E. Benson*), det. A. Roman. (B.M.Coll.)

Coelichneumon purpurissatus nom. nov.

syn. *Ichneumon nigrator* Fabricius, 1793, *nec* Mueller, 1776.
Ichneumon lineator varr. 1–5 Wesmael, 1844.
Coelichneumon lineator auctt. ex parte.

I am using this name for the species which is very closely related to *comitator* L., but in which the hair on the propodeum is fuscous and not pale, and the abdomen more clearly metallic. Trentepol in his redescription of *nigrator* described the hind femur as being red, with a fuscous line outwardly, the front and middle femora being black. This would apply better to the present species than to *comitator*. *Coelichneumon subviolaceiventris* (Pic) *(***comb. nov.***)* (=*Ichneumon subviolaceiventris* Pic, 1908, *Échange*, **24**: 67) is very similar to *purpurissatus* but can at once be distinguished by the lack of the scopa on the hind coxa.

Various other names are given by Dalla Torre as synonyms of *Ichneumon lineator* auctt. Of these *biguttatus* Thunberg (syn. *biguttorius* Thunberg) is *Stenichneumon lineator* (F.); *narrator* F. is more probably a specimen of *Coelichneumon comitator* (L.); *fuscatorius* Thunberg is uncertain as to position, the type was not found by Roman, and it is described as having the legs red with the femora black; *I. caerulescens* Tischbein is described as having the apical angles of the 1st tergite marked with ivory, and I have seen no specimen agreeing with his description of this species, which may be distinct. I have therefore been forced to propose a new name for this form.

ENGLAND: Cornwall; Gurnards Head, 1♂, 1–8.viii.1936, on umbels of *Smyrnium* (*G. D. Hale Carpenter*); Polperro, 1♀ (*T. A. Marshall*); St. Minver, 1♀, 1.viii.1910 (*Le Marchant*); no locality, 1♀, bred 1.vii.1910 *ex Dianthoecia barrettii* (*H. M. Edelsten*) (B.M.Coll.); Devon; Prawle Point, 1♂, 8.v.1938 ex. *Dianthoecia barrettii* (*A. J. L. Bowes*); Cornwall; nr. Bude, 1♂, 23.vi.1910 (*F. C. Woodforde*); Hants; New Forest, Ashurst Walk, 1♀, 9–10.vi.1912 (*F. C. Woodforde*) (Hope Department, Oxford). Cornwall; Carbis Bay, 2♀, 29.viii.1928 and 13.ix.1931 (*A. Thornley*) (C. Morley Coll.).

Coelichneumon serenus (Gravenhorst, 1820)

This I regard as a distinct species. Of it I have seen only 1 male, Desvignes Coll., and 2 females from the old British collection in the British Museum.

Coelichneumon truncatulus (Thomson, 1886)*

I am now also regarding this species as distinct. ENGLAND: Lancs; Kent; Surrey; Herts; Bucks. 13♂, 11♀, v–vi. (B.M.Coll.)

HERESIARCHINI

Heresiarches eudoxius (Wesmael, 1844)*

ENGLAND: Hants; New Forest, Minstead Wood, 1♂, 15.vii.1934 (*C. Morley*); 2♂, 1♀ (*Capron*) (cf. Morley, *British Ichs.* **1**: 203, footnote). (C. Morley Coll.)

ICHNEUMONINI

Hoplismenus bidentatus (Gmelin, 1790)

syn. ***Hoplismenus bispinatorius*** auctt. angl.

Aoplus defraudator (Wesmael, 1844)*

SCOTLAND: Inverness and Perthshire, and IRELAND: Co. Wicklow; 3♂, 11♀, vi—ix (B.M.Coll.)

Aoplus altercator (Wesmael, 1855)

ENGLAND: Bucks and Somerset. SCOTLAND: Perthshire and Inverness. IRELAND: Co. Wicklow. 2♂, 9♀, vi—viii. (B.M.Coll.)

Aoplus virginalis (Wesmael, 1844)*

ENGLAND: Suffolk; Staverton Thicks, 2♀, 11.vii.1914 (*C. Morley*). (C. Morley Coll. det. as *Barichneumon eupitheciae* Brischke.)

Cratichneumon clarigator (Wesmael, 1844)*

ENGLAND: Surrey; Hunts; Herts; Kent. 15♂, 2♀, v–vii. (B.M.Coll.)

Cratichneumon jocularis (Wesmael, 1848)

syn. ***Cratichneumon dissimilis*** auctt. angl.

IRELAND: Co. Down; Newcastle, 2♂ (*W. F. Johnson*) (Dublin Museum). ENGLAND: N. Yorkshire. SCOTLAND: Nairn and Aberdeen. IRELAND: Co. Wicklow. 6♂. (B.M.Coll.) SCOTLAND: "The Mound," 1♀, 8.viii.1900 (*Yerbury*). (Morley Coll.)

Cratichneumon pseudocryptus (Wesmael, 1857)*

ENGLAND: 1♀. (*Capron*) (In C. Morley Coll. under *Plectocryptus tinctorius* (Gravenhorst)).

Barichneumon leucocheilus (Wesmael, 1844)*

1♂, labelled "734 *transfuga*" from British Collection. ENGLAND: Surrey; Byfleet, 1♀, 26–29.v.1949 (*R. B. Benson*). (B.M.Coll.)

Barichneumon praeceptor (Thunberg, 1822)

syn. ***Barichneumon bilunulatus*** auctt. angl.

Barichneumon coxiglyptus Heinrich, 1951

syn. *Barichneumon incubitor* auctt. angl.

A rather common species. In the B.M. Coll. is material from Surrey ; Suffolk ; Devon ; Cambs ; Herts ; Hereford ; Kent. v–vi, viii–ix.

Barichneumon citator (Thunberg, 1822)

ENGLAND : Devon ; Dartmoor, 1♂, 1.vi.1935 (*R. C. L. Perkins*) ; Lydford, 1♀, 8–10.ix.1946 (*J. F. Perkins*). (B.M.Coll.)

Ichneumon exilicornis Wesmael, 1857*

There is a single ♀ of this species from the Desvignes collection. (B.M.Coll.)

Ichneumon tuberculipes Wesmael, 1848*

This species has most usually been recorded as *languidus* Wesmael in Britain. In the British Museum collection there is material from Devon, Hants and Essex.

Ichneumon megapodius Heinrich, 1949

A parasite of *Amathes alpicola* and I have examined 4 males and 3 females, all reared from pupae of this host from Perthshire (*K. Todd*) and Inverness (*P. Harwood*). British specimens are much more extensively marked with red than those from the Alps.

Ichneumon fuscatus Gravenhorst, 1829

There is a single female which may belong to the above species, and which is quite distinct from any other species known to me, from Surrey ; Chobham, 9.vi.1910 (*G. Le Marchant*). (B.M.Coll.)

Ichneumon eurycerus Thomson, 1890

SCOTLAND : Inverness ; Nethy Bridge, 1♀, 30.v.1931 ; Perth ; Rannoch, 1♀, v.1922 ; ENGLAND : W. Suffolk, 1♀, 1928 (*P. Harwood*). (B.M.Coll.)

Ichneumon crassifemur Thomson, 1886*

I have only seen material of this species from the Desvignes and Stephens collections. It was previously regarded as a synonym of *molitorius* L.

Ichneumon melanotis Holmgren, 1864

This species, too, I regard as distinct from *molitorius*. In the British Museum collection there is material from Hants, Bucks and Inverness.

Ichneumon septentrionalis s. sp. *atrifemur nom. nov.*

syn. *scelestus* Perkins, 1952, *nec* Cresson, 1864.

For information concerning this species see Perkins, 1952, *Bull. ent. Res.* **48** : 361.

Ichneumon lautatorius Desvignes, 1856*

This species is now regarded as being distinct from *sarcitorius* L.

Exephanes amabilis Kriechbaumer, 1895

IRELAND: Co. Meath, 1♀, ix.1922 (*G. L. R. Hancock*) det. G. Heinrich. ENGLAND: Cambs; Adventurers fen, 1♂, 8.vii.1924 (*G. L. R. Hancock*). (B.M.Coll.) Norfolk; Wroxham, 1♀, 3.ix.1902 (*G. A. K. Marshall*). (Hope Department, Oxford).

Exephanes caelebs Kriechbaumer, 1890

IRELAND: Co. Cavan; Lisney, 1♀, 31.v.1936; Sandpit, Arva Road, 1♀, 21.v.1934 (*R. C. Farris*); Co. Wicklow; Enniskerry, 1♀, 25.viii.1935 (*J. F. Perkins*). (B.M.Coll.)

Thyrateles camelinus (Wesmael, 1844)*

ENGLAND: Essex, Loughton, 1♀ (*G. C. Champion*); 1♀, Stephens Coll. (B.M.Coll.) Both specimens were previously determined as *Ctenicheunom castigator* (F.).

Ctenichneumon rubroator (Ratzeburg, 1852)

syn. *Ctenichneumon melanocastaneus* auctt. angl.

Not uncommon. ENGLAND: Devon; Essex; Cornwall; vi—vii. (B.M.Coll.)

Ctenichneumon devylderi (Holmgren, 1871)

syn. *Ctenichneumon repentinus* auctt. angl.

There has been confusion between this species and *repentinus* (Gravenhorst), of which I have seen no specimens from Britain. ENGLAND: Bucks and Essex, 6♂, 5♀. (B.M.Coll.)

Spilichneumon johansoni (Holmgren, 1871)

ENGLAND: Northants; Herts; Kent; Bucks; Surrey. 5♂, 4♀. (B.M.Coll.)

Spilichneumon stagnicola (Thomson, 1888)*

ENGLAND: Gloucestershire; Forest of Dean, High Meadow Woods, 1♀, 9.vi.1936 (*E. B. Britton* and *J. F. Perkins*); Hants; New Forest, 1♀, 15.vi.1912 (*G. T. Lyle*); Hereford; Malvern Hills, 1♀, 20–21.iv.1935 (*R. B. Benson*); Kent; Tunbridge Wells, 1♀, viii.1920 (*C. G. Nurse*). (B.M.Coll.)

Amblyteles gradatorius (Thunberg, 1822)

syn. *Amblyteles egregius* (Gravenhorst, 1829).

SCOTLAND: Perth; 1♂, vi.1914, *ex Eurois occulta* (*P. Harwood*); Rannoch, 1♀, vi.1927 (*P. Harwood*). (B.M.Coll.)

Amblyteles longigena Thomson, 1888.

syn. *Amblyteles cerinthius* auctt. angl.

SCOTLAND : Forfar ; Perth ; Isle of Arran. ENGLAND : Kent ; Devon. 6♂, 7♀. (B.M.Coll.)

Amblyteles elongatus Brischke, 1878

syn. *Amblyteles subsericans* var. *elongatus* Brischke *sec* Heinrich.

This is a common species which used to be determined as *subsericans* (Gravenhorst), and of which the male appears to be much rarer than the female. Heinrich has described the genus *Limerodops* for this species.

Amblyteles subsericans (Gravenhorst, 1820)

syn. *Amblyteles fossorius* auctt. angl.

This is a more robust species than *elongatus* and is rarer. I have seen material of it from ENGLAND : Bucks, Herts and Glos., the male being more frequently captured than the female. *A. subsericans* has been given as a synonym of *fossorius* L., but I have re-examined the male type of that species and found it to be *A. viridatorius* (F.), a species unknown to me from Britain.

Acolobus sericeus Wesmael, 1844*

ENGLAND : Essex and Hants, 3♂, 5♀, the Hants specimens bred from *Ectropis luridata* (syn. *extersaria*). (B.M.Coll.)

Probolus concinnus Wesmael, 1853*

This is a distinct species. ENGLAND : Hants ; W. Suffolk ; Northants ; Cornwall. 6♂, 4♀, vii–ix. (B.M.Coll.)

PLATYLABINI

Rhyssolabus arcticus Hellén, 1942

SCOTLAND : Inverness ; Cairn Lochain, 3–4,000 ft., 1♂, 3.vii.1934 (*R. B.* and *J. E. Benson*) ; Aviemore, *ex Psodos coracina*, 1♀, 22.v.1948 (*A. Richardson*). (B.M.Coll.) I am indebted to Mr. G. Heinrich, who pointed out the probable identity of this species.

Platylabus intermedius Holmgren, 1871

ENGLAND : Devon ; Bickleigh, 1♂, 19.vi.1880 (*G. C. Bignell*), previously det. as *pedatorius* (F.) (Bignell Coll.) ; Cornwall ; Botusflemming, 1♂ (*T. A. Marshall*). SCOTLAND : Inverness ; Cairn Lochain, 3–4,000 ft., 1♂, 3.vii.1934 (*R. B.* and *J. E. Benson*) ; Ross-shire ; Glenshiel, 1♂, 1.vii.1934 (*O. W. Richards*). (B.M.Coll.)

Platylabus opaculus Thomson, 1888

ENGLAND : Essex ; Colchester (*Harwood*) ; IRELAND : Co. Cavan ; Farnham, 29.vi.1935 (*R. C. Farris*) 2♂, 6♀. (B.M.Coll.)

Platylabus gigas Kriechbaumer, 1886.

England: Hants; New Forest, 1♂, 29.iv.1912 *ex Selenia tetralunaria* (*F. C. Woodforde*). (Hope Department, Oxford).

Platylabus punctifrons Thomson, 1888*

England: Essex; Colchester, 1♂, 1♀ (*Harwood*); Frinton, 2♀, viii and ix.1919 (*C. G. Nurse*); Suffolk; Sudbury, 1♀, 1916 (*P. Harwood*); Kent; Halstow Pier (flying south over Thames estuary), 1♀, 25.ix.1949 (*J. F. Burton*). (B.M.Coll.) 3♀ *ex Eucymatoge subnotata*, 18.viii.1879 (previously det. as *pedatorius* (F.)) (G. C. Bignell Coll.).

Platylabus obator Desvignes, 1856*

This is a distinct species, recognizable from *pedatorius* (F.) by the black stigma and more strongly raised epicnemia, and in the female by the conspicuously black apex to the hind femur. England: Devon; Hereford; Herts; Surrey; Glos.; Cornwall. 49♂, 7♀, v–vii. (B.M.Coll.) In 1941 and 1942 the male of this species was quite common flying around *Galium molugo* in the lanes around Newton Abbot.

Platylabus rufiventris Wesmael, 1844.*

England: Devon; Dartmoor, 1♂, 18.viii.1934 (*R. C. L. Perkins*). (B.M.Coll.)

Platylabus concinnus Thomson, 1888

England: Devon; Braunton, 1♂, 5.vii.1930 (*Wright*); Cornworthy, 1♀ (*T. A. Marshall*); Essex; Colchester, 1♂, 1909 (*Harwood*); Suffolk; 1♀, bred 4.viii.1911 (*C. G. Nurse*). Both the females were previously det. as *dolorosus* (Gravenhorst). (B.M.Coll.) Lichfield, 2♀, 1921, det. as *Platylabus daemon* by Schmiedeknecht. (Carr Coll.) Heinrich has placed this species in *Asthenolabus*, but in spite of its rather small thyridiae, I consider it better retained in *Platylabus*.

Asthenolabus latiscapus Thomson, 1894

England: Devon and Suffolk *ex Euphyia cuculata*, 7♂, 3♀. vi–vii. (B.M.Coll.)

PHAEOGENINI

Dicaelotus orbitalis Thomson, 1891

England: Suffolk; Assington, 1♀, 16.v.1902 (*C. Morley*). (B.M.Coll.) Ireland: Co. Kildare; Rye Water, 1♀, 8.vii.1945 (*A. W. Stelfox*). (Stelfox Coll.)

Dicaelotus pudibundus (Wesmael, 1844)*

England: Bucks; Slough, 1♀, 9.vi.1937 (*O. W. Richards*). (B.M.Coll.) Isle of Wight; Ryde, 1♀, 11.viii.1902 and 1♀, 17.viii.1903 (det. previously as *rufilimbatus* (Gravenhorst)). (C. Morley Coll.)

Dicaelotus pictus (Schiedeknecht, 1903). ***(comb. nov.)***

syn. *Deloglyptus pictus* Schmiedeknecht.

ENGLAND : 1♂, Desvignes Coll. (previously det. as *Herpestomus arridens* (Gravenhorst)) ; Herts ; Boxmoor, 1♀, 11.v.1935 (*R. B.* and *J. E. Benson*). (B.M.Coll.)

Dicaelotus punctiventris (Thomson, 1891). ***(comb. nov.)***

syn. *Deloglyptus punctiventris* Thomson.

ENGLAND : Bucks ; Burnham, in empty barn, 1♀, 21.vii.1941 (*O. W. Richards*). (B.M.Coll.) Suffolk ; Barton Mills, 1♀, 5.vi.1916 (*C. Morley*) previously det. as *Melanomicrus elliotti* Morley. (C. Morley Coll.)

Dicaelotus erythrostomus Wesmael, 1844

ENGLAND : Hants ; Sopley Common, on sand, 1♀, 16.vii.1949 (*O. W. Richards*) ; IRELAND : Co. Galway ; Bencorr, 2,000 ft., 1♀, 3.vii.1946 (*R. A. Lever*). (B.M. Coll.)

Dicaelotus cameroni Bridgman, 1881

This I regard as a distinct species. I have seen only the type from Britain and a single female from Germany (Ruthe Coll.).

Dicaelotus rufoniger Berthoumieu, 1896

syn. *Dicaelotus pumilus* var. *rufoniger* Berthoumieu.

The majority of the material of this species that I have examined has been from Ireland. In the B.M.Coll. are specimens from Co. Wicklow, Co. Sligo, Co. Kildare and Co. Wexford (*A. W. Stelfox*), and a ♀ from Herts ; St. Albans (*T. A. Marshall*). I have also examined 3♂ and 20♀ in the A. W. Stelfox Coll.

Dicaelotus inflexus Thomson, 1891

ENGLAND : 1♀ (*Desvignes*). (B.M.Coll.) IRELAND : 1♀. (Stelfox Coll.)

Dicaelotus morosus Wesmael, 1855

ENGLAND : Bucks ; Kent. IRELAND : Co. Leitrim. 27♀. (B.M.Coll.)

Eparces grandiceps Thomson, 1891*

No locality, 1♀, 14.iv.1900, det. as *C. opprimator* C.M., ix.1902. (C. Morley Coll.) This is probably the specimen recorded by Morley from Bramford Marshes, near Ipswich (*Brit. Ichs.* **1** : 281).

Micrope macilenta (Wesmael, 1844)

IRELAND : Co. Kildare ; Skerries Bog, 1♀, 23.ix.1948 (*A. W. Stelfox*). (Stelfox Coll.) I have followed Thomson's interpretation of this genus and species.

Diadromus tenax Wesmael, 1844*

ENGLAND: 1♂, Desvignes Coll. (B.M.Coll.)

Diadromus albinotatus (Gravenhorst, 1829)

ENGLAND: Devon; Newton Abbot, 2♂, 3.viii.1941 (*J. F. Perkins*) and 1♀, 6.viii.1941 (*R. C. L. Perkins*). (B.M.Coll.)

Phaeogenes curator (Thunberg, 1822)

ENGLAND: 1♀, Desvignes Coll.; Monmouth; Trelleck Beacons, 1♀, 10.vi.1936 (*E. B. Britton* and *J. F. Perkins*). (B.M.Coll.)

Phaeogenes elongatus Thomson, 1891

ENGLAND: Herts; Bricket Wood, 1♀, 17.vi.1936 (*R. B. Benson*). (B.M.Coll.) No locality, 1♂, bred *ex E. nigricostana* (*Bignell*); Suffolk; Monks Soham Garden, 1♂, 14.viii.1917; 1♀, without data. All previously det. as *Centererus opprimator* (Gravenhorst). (C. Morley Coll.)

ALOMYINI

Alomya semiflava Stephens, 1835*

A rather common species, appearing later in the year than *debellator* (F.) (see Perkins, 1952, *Bull. ent. Res.* **48**: 363).

XI. DESCRIPTIONS OF NEW SPECIES OF BRITISH ICHNEUMONINAE

Below are given the descriptions of the species that I believe to be previously undescribed. Due to the lack of grouping of the many species that have already been described, it is very difficult indeed to be at all certain of this. When the opportunity arises for someone who has very extensive collections of the European species of this subfamily, to see all the types that are scattered throughout Europe, it is certain that many species that are now thought to be distinct will prove to be already described under other names.

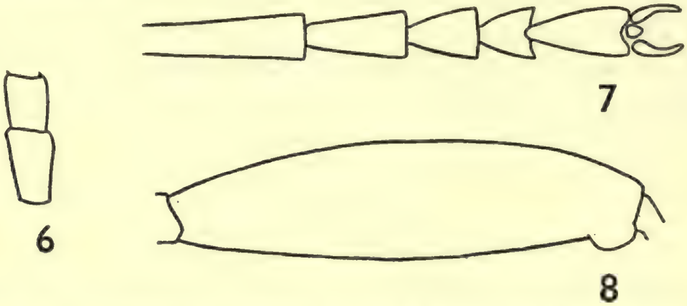
Ichneumon quartanus sp. nov.

Similar to *Ichneumon insidiosus* Wesmael (of which I have examined the series of syntypes) in general facies and in the relatively short basal segments of the flagellum, but at once distinguished from that species in having a large, ivory, apical spot on tergite 5 of the gaster.

♀. Head distinctly narrowed behind the eyes; malar space long, longer than the post-anellus (malar space : breadth of base of mandible about 1·2 : 1); mandible strongly narrowed to the apex, the lower tooth distinct; inner orbits sub-parallel centrally; antenna with 42–44 segments; flagellum with the basal segments somewhat short (Fig. 6), conspicuously widened beyond the middle and strongly attenuate apically, beneath, at its widest, with the flattened ventral area of the segments a little broader than long ; post-anellus length : breadth about 1·5 : 1 ; frons, dorsally, coarsely rugose-punctate, with only indistinct microsculpture ; face rather coarsely punctate, irregularly striate beneath the antennal sockets and, in part, on the epistoma ; clypeus rather coarsely, rather sparsely punctate with an apical row of closer punctures.

Thorax similar in sculpture to *insidiosus*, but the pronotum, laterally, with coarser punctures ; propodeum with the area superomedia a little transverse ; area petiolaris rugose-punctate, not divided from the more coarsely rugose areae internae ; middle tarsus a little stout as in *insidiosus* (Fig. 7) ; hind femur (Fig. 8) a little thinner than in *insidiosus*, length : breadth about 3·9 : 1 (in *insidiosus* about 3·6 : 1) ; hind coxa closely punctate, with no scopa.

Gaster with the central area of post-petiole with the striae rather close and rather regular ; tergite 2 with moderately broad thyridiae (breadth : distance between thyridiae about 1 : 1·25), rather closely punctate, in part striate between the gastrocoeli and centrally, tergite 3 basally with the punctures comparable with those at the apex of tergite 2, becoming sparser apically, but still clearly impressed.



FIGS. 6–8. *Ichneumon quartanus*, ♀ ; fig. 6, Antennal segments 3 and 4 ; fig. 7, middle tarsus ; fig. 8, hind femur.

Colour : head black, inner orbits sometimes yellow or red ; scape and pedicel black, segments 3–8 of antenna red, 9–15/16 ivory, the following segments fuscous or black ; thorax black, scutellum largely ivory ; gaster with the tergites black, the post-petiole in part and tergites 2–3 red (3 sometimes fuscous apically) ; tergites 4–7 with an apical ivory spot, that on 4 being narrower than the spot on 5 ; coxae and trochanters black, trochantelli red ; femora red with the hind femur broadly black dorsally and apically ; tibiae and tarsi red, the hind tibia narrowly infuscate apically and the apical hind tarsal segments infuscate ; wings yellowish clouded, costal vein and stigma pale testaceous.

Length : 12 mm.

♂. Unknown.

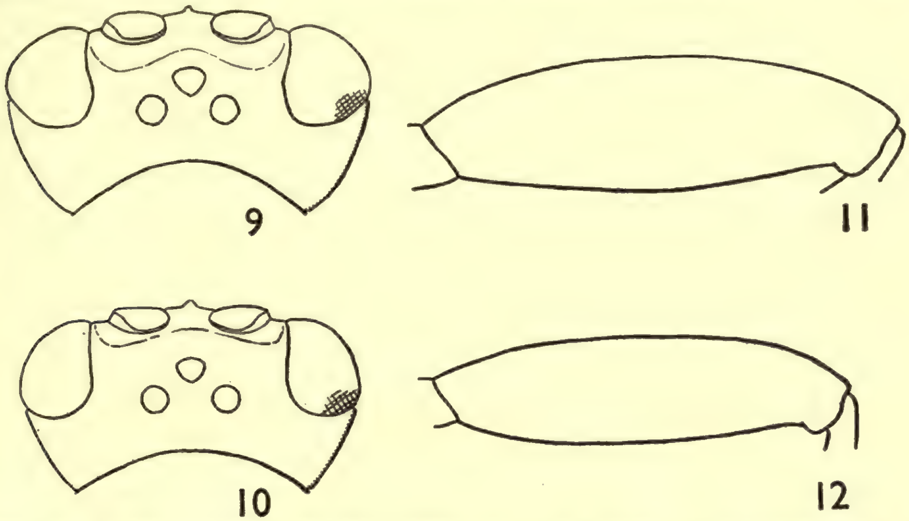
HOLOTYPE. ♀. Hym. 3b 1821. ENGLAND : Westmorland ; Langdale Pikes, 20.vi.1937 (*A. E. Wright*). (B.M.Coll.)

PARATYPE. ♀. SCOTLAND : Inverness ; Nethy Bridge, 1931 (*P. Harwood*). (B.M.Coll.)

Ichneumon caproni sp. nov.

Closely related to *Ichneumon nereni* Thomson and to *minutorius* Desvignes (= *captorius* Thomson). (I have examined the type or syntypes of all these species.) It differs from both these species in having a thicker hind femur and in having the head less sharply and more convexly narrowed behind the eyes; the post-petiole is less strongly striate as in *nereni*, but has no white spot at the apex of tergite 5 (in the seven examples seen), whereas in *nereni* it is most usually present.

♀. Head convexly narrowed behind the eyes (Fig. 9); malar space long, but slightly shorter than the post-anellus; mandible strongly narrowed to the apex, the lower tooth distinct; inner orbits sub-parallel centrally; antenna with 32–34 segments, flagellum with the basal segments elongate, distinctly widened beyond the middle and attenuate apically; post-anellus length : breadth about 2 : 1; ninth antennal segment about as long as broad; frons rugose-punctate above, with microsculpture; face punctate, striate-punctate beneath the antennal sockets, and with sparser, coarser punctures on the epistoma, clypeus basally with the punctures similar to those on the epistoma, at most with a few scattered punctures in the apical half.



FIGS. 9–12. Head dorsally, hind femur laterally: figs. 9 and 11, *Ichneumon caproni*, ♀; figs. 10 and 12, *I. nereni*, ♀.

Thorax similar in sculpture to *nereni*, though the punctures on the whole are a little smaller and closer; propodeum with the area superomedia a little transverse, the area petiolaris not margined laterally, punctate or punctate-rugose, becoming rugose, narrowly, dorsad, but clearly differentiated from the more coarsely rugose areae internae; front and middle tarsi a little broader than in *nereni*; the hind femur a little incrassate, length : breadth about 3·5 : 1 (Fig. 11); hind coxa a little more finely and a little more closely punctured than in *nereni*, with no scopa.

Gaster with the post-petiole rather finely striate; tergite 2 rather coarsely punctate, somewhat striate between the gastrocoeli and centrally, the thyridiae rather narrow (breadth : distance between thyridiae about 1 : 1·75); tergite 3 basally, similar in sculpture to the apical half of tergite 2, the punctures very shallow or erased apically.

Colour: head black, inner orbits red, or yellow or at least with pale marks on the frontal orbits; scape black, sometimes marked with red, pedicel fuscous; antennal segments 3–8 red, sometimes marked with fuscous, segments 8/9–14/15 ivory, the following segments fuscous or black; thorax black, the sub-alar callus sometimes marked red, scutellum for the greater part ivory; gaster with the tergites black, except the apex of the post-petiole marked with red; tergites 2–3 red, sometimes marked with yellow, 6 and 7 with a large, ivory, apical spot; legs with the coxae and trochanters black, the trochantellus red; front and middle femora red, broadly marked with black; hind femur black narrowly red basally; front and middle tibiae and tarsi testaceous, the apex of middle tibia and apical tarsal segments sometimes infuscate; hind tibia testaceous, fuscous apically; hind tarsus fuscous or black, sometimes paler basally; wings very weakly smoky, the costal vein pale testaceous, fuscous apically, the stigma testaceous.

Length: 9–11 mm.

♂. Unknown.

HOLOTYPE. ♀. Hym. 3b 1822. ENGLAND: (*Capron Coll.*) (B.M.Coll.)

PARATYPES. ENGLAND: 1♀ (Capron Coll., det. as *gracilicornis* by Capron); 1♀, B.M. British Coll. (det. as *ammonius* in Desvignes' catalogue). GERMANY: 1♀, Ant., 6.x (*Buchecher*); 1♀, Lag., 4.viii.1865 (*Buchecher*). France: 1♀, Castellane, 9.iv.1931 (*C. Morley*). (B.M. Coll.) ENGLAND: 1♀, Capron Coll. (det. as *gracilicornis* by Capron). (C. Morley Coll.)

Ichneumon aquilonius sp. nov.

Related to *vulneratorius* Zetterstedt, *walkeri* Wesmael and *polyonomus* Wesmael (this latter I regard as a subspecies of *walkeri*, from the Alps). It differs from *vulneratorius* in having the clypeus remotely punctate in the apical half and the central area of the post-petiole much more strongly, longitudinally striate; from *walkeri* and *polyonomus* in having the hind coxa much more coarsely, though closely punctate beneath and with no trace of a scopa; superficially it differs from all three in having an orange-coloured scutellum (though this may well vary). As with most of these northern species, the colour will probably show great variation.

♀. Head strongly narrowed behind the eyes; malar space long, about 1⅛ times as long as the breadth of base of mandible; mandible strongly narrowed to the apex, the lower tooth distinct; inner orbits diverging a little ventrad; antenna with 33 segments; flagellum with the basal segments elongate, conspicuously widened beyond the middle and attenuate apically, at the widest with the flattened, ventral area of the segments slightly wider than long; post-anellus length : breadth = 1·7 : 1; flagellar segment 5/6 quadrate; frons, dorsally rugose-punctate and in part with microsculpture on the rugae and in the interspaces between the punctures; face, for the most part, with clear punctures becoming rugose-punctate beneath the antennal sockets and in part centrally; clypeus with rather sparse punctures, very sparse in the apical half but with an apical row of more or less distinct, rather close punctures.

Thorax similar in sculpture to *vulneratorius*; propodeum with the area superomedia quadrate or a little transverse, more or less closed posteriorly, the area petiolaris not margined laterally, punctate dorsad, rugose ventrad and thus little differentiated in sculpture from the areae internae; front and middle tarsi thin, as in *vulneratorius*; hind coxa closely punctate beneath tending to rugose-punctate before the apex, with no scopa; hind femur moderately thin as in *vulneratorius*.

Gaster with the central area of the post-petiole coarsely, longitudinally striate; tergite 2 with broad transverse thyridiae (breadth : distance between thyridiae about 1·8 : 1); tergite 2 closely punctate, in part striate between the gastrocoeli and centrally; tergite 3 closely punctate basally, becoming more sparsely punctate apically.

Colour: head black with the clypeus, epistoma and inner orbits red; scape red, fuscous basally; pedicel fuscous; basal flagellar segments red or marked with fuscous, antennal segments 8/9–13/14 ivory, beyond this black; pronotum black with the collar centrally, and the upper margin laterally, red; mesosternum and mesopleurum black with the sub-alar callus marked with red ; mesoscutum red, more or less marked with fuscous anteriorly ; scutellum orange ; post-scutellum red ; propodeum black ; gaster red, the 4th segment sometimes black, the following segments black ; legs red with the coxae and trochanters black (in part, slightly reddish in the type) ; femora sometimes conspicuously marked with black ; apex of hind femur and apical tarsal segments sometimes marked with fuscous ; wings yellowish, the costal vein and stigma pale testaceous.

Length : 8 mm.

♂. Unknown.

Holotype. ♀. Hym. 3b 1823. Scotland : Perthshire ; Killin, 15–21.vi.1932 (*R. B. Benson*).

Paratype. ♀. England : Westmorland ; Fairfield, *c.* 2,500 ft., 5.iv.1938 (*G. J. Kerrich*).

THYRATELES gen. nov. (Ichneumonini)

Clypeus flat ; the occiput somewhat impressed behind the ocelli ; mandibles strongly narrowed to the apex ; pronotal collar rather narrow, the transverse groove deeply impressed ; scutellam strongly convex ; propodeum with the basal groove distinct, the area basalis with no central tubercle, the area superomedia more or less quadrangular, no dentiparal spines ; post-petiole with the central area longitudinally striate or rugose-striate, and not conspicuously raised at the line of the spiracles ; gastrocoeli deep and broad, thyridiae distinct (Fig. 13) ; claws impectinate.

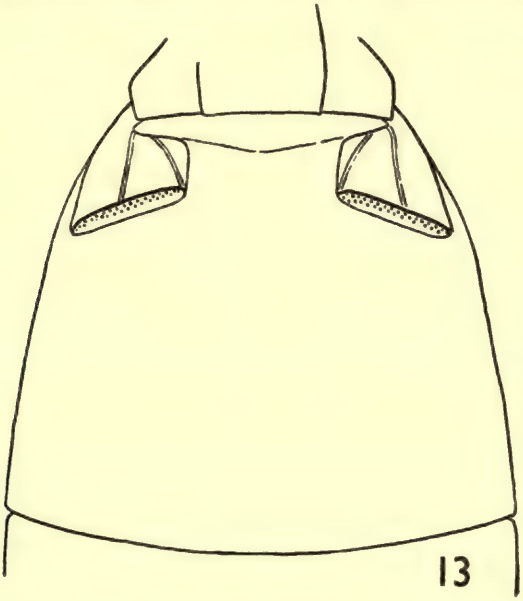


Fig. 13. *Thyrateles camelinus*, ♀ : 2nd tergite.

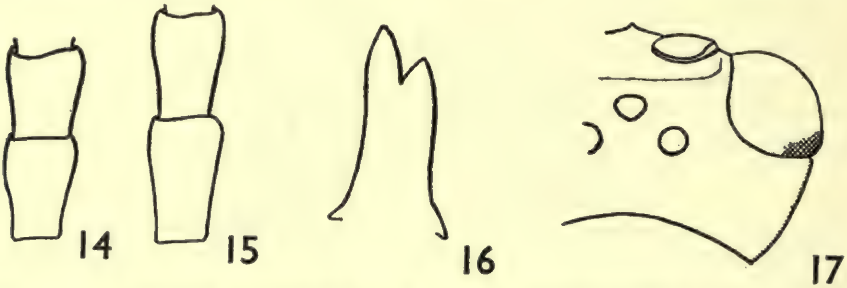
♀ with the hypopygium as in *Amblyteles* ; the flagellum strongly elongate.

Type species *Amblyteles camelinus* Wesmael.

This genus belongs to that group represented in the Holarctic region by *Patroclus*, *Ctenamblyteles* (syn. *Pseudamblyteles*) and *Hybophorellus*. All these genera have females in which the hypopygium is like *Amblyteles*, but which have conspicuous and often large thyridiae. A few species in *Amblyteles* have small thyridiae, but *Ctenichneumon*, with which certain of the above genera have previously been confused in Europe, has the thyridiae completely absent. Both *Patroclus* (to which the European *Ctenichneumon sputator* (F.) belongs) and *Ctenamblyteles* have the claws pectinate at least towards the base (this pecten is not to be confused with the row of oblique, contiguous, basal teeth). *Hybophorellus* has shallow gastrocoeli, a strongly convex clypeus and dentiparal spines. Amongst the material in the British Museum I have noted no species outside this area which would be referable to this group. Descriptions most usually fail to mention the presence or absence of thyridiae which seem important in this section of the Ichneumoninae.

Spilichneumon celenae sp. nov.

This species belongs to the section of *Spilichneumon* having, in the female, robust mandibles with the lower tooth small and much shorter than the enlarged upper tooth, the hypostomal carina conspicuously raised and the front and middle tibiae coarsely spinulose.



FIGS. 14–17. Antennal segments 2 and 3: fig. 14, *Spilichneumon celenae*, ♀; fig. 15, *S. simplicidens*, ♀. Mandible, fig. 16, and head dorsally, fig. 17, *S. celenae*, ♀.

♀. Head with the temples distinctly narrowing behind the eyes (Fig. 17); malar space a little shorter than the breadth of base of mandible; mandible with the sides of the shaft sub-parallel, only very weakly expanded beyond the middle, the upper tooth larger than the lower (Fig. 16); antenna very little widened beyond the middle, strongly attenuate apically, with 36 segments, the post-anellus short, length : breadth about 1·2 : 1 (Fig. 14), the 4th antennal segment sub-quadrate; frons dorsally, coarsely punctate and weakly coriaceous; face rather coarsely punctate, somewhat striate dorsad and with the punctures becoming finer and sparser towards the malar space; clypeus (which is relatively a little smaller than in *stagnicola*) rather coarsely punctate, the punctures more sparse centrally, towards the apex.

Thorax: sculpture similar to that of *stagnicola*; pronotal collar short; propodeum with the strongly elongate area superomedia open behind, the lateral carinae erased posteriorly and the area petiolaris divided from the areae internae; front and middle tarsis a little expanded (mid tarsus with segment 2 about twice as long as broad), hind femur thickened (length : breadth about 3·2 : 1).

Gaster with the post-petiole finely striate; tergite 2 with small and very shallow gastrocoeli, thyridiae absent, rather finely, rather sparsely punctate, the punctures sparser apically, only striate at the extreme base; 3rd tergite basally similar in puncturation to the apex of the 2nd, apically with the punctures becoming very fine and very sparse ; 4th tergite basally similar in puncturation to the apex of the 3rd, apically, together with the remaining segments with only very fine punctures ; sternites 2 and 3 with a ventral fold.

Colour : head black, sometimes with the inner and vertical orbits more or less red-marked ; antenna black or fuscous, with segments 8–13 ivory or marked with ivory ; thorax black, pronotal collar sometimes red-marked centrally, scutellum for the greater part ivory ; legs with the coxae black, trochanters black, narrowly yellow apically ; front and middle trochantelli black or piceous, femora red, black basally, tibiae and tarsi testaceous, the apex of the tarsi somewhat infuscate ; hind trochantellus red, fuscous dorsally, femur black, reddish apically and at extreme base, tibia pale testaceous, fuscous apically, tarsus testaceous with the apices of the segments infuscate ; gaster black with tergites 2 and 3 red, 4 basally, laterally, sometimes red ; tergites 6 and 7 with a large, ivory apical spot ; wings with the costal vein pale testaceous, fuscous apically, stigma pale testaceous.

♂. Head with the temples distinctly narrowing behind the eyes ; malar space about half as long as the breadth of base of mandible ; mandible with the sides of the shaft narrowing distally ; antenna with tyloidae on segments 5/6–17/19, that on 5 when present being weak ; frons rugose-punctate above ; face coarsely punctate, striate in part below the antennal sockets ; clypeus coarsely punctate, weakly rounded apically ; thorax more coarsely and closely punctured than in the female ; propodeum with the area superomedia elongate and closed posteriorly, the lateral carinae complete, the area petiolaris divided by strong carinae from the areae internae ; hind femur, length : breadth about 3·7 : 1.

Gaster with the post-petiole more coarsely and irregularly striate than in the ♀ ; tergite 2 with the gastrocoeli ill-differentiated and shallow, thyridiae absent, rather closely punctured, striate between the gastrocoeli and extending more or less to the apex of the segment ; tergite 3 sub-quadrate, a little more finely and less closely punctate than tergite 2, centrally, basally striate-rugose ; sternites 2 and 3 with a median fold ; hypopygium with a sub-acute, central, apical projection.

Colour : head black ; face yellow, black centrally, varying to black with the orbits yellow ; clypeus yellow sometimes marked with black ; scape marked with yellow beneath ; thorax black, collar sometimes red centrally, scutellum marked with yellow, tegula pale testaceous ; coxae black, trochanters black, narrowly yellow apically ; trochantelli testaceous, fuscous dorsally ; front and middle femora red, broadly marked with black ; front and middle tibiae and tarsi testaceous, the tarsi in part infuscate ; hind femur black, narrowly red basally and apically ; hind tibia pale testaceous, fuscous apically ; hind tarsus fuscous, testaceous basally ; gaster black ; extreme apex of post-petiole, and tergites 2 and 3 testaceous ; tergite 4 testaceous laterally, basally ; wings with costal vein pale testaceous, infuscate apically, the stigma pale testaceous.

Length : ♂ 12 mm., ♀ 11 mm.

HOLOTYPE. ♀. Hym. 3b 1824. IRELAND : *ex Celena haworthii*, 1884 (*W. V. de F. Kane*). (B.M.Coll.)

ALLOTYPE. ♂. IRELAND : Co. Wicklow ; Tonlagee Mt., 1–2,000 ft., 22.viii.1937 (*A. W.* and *G. M. Stelfox*). (B.M.Coll.)

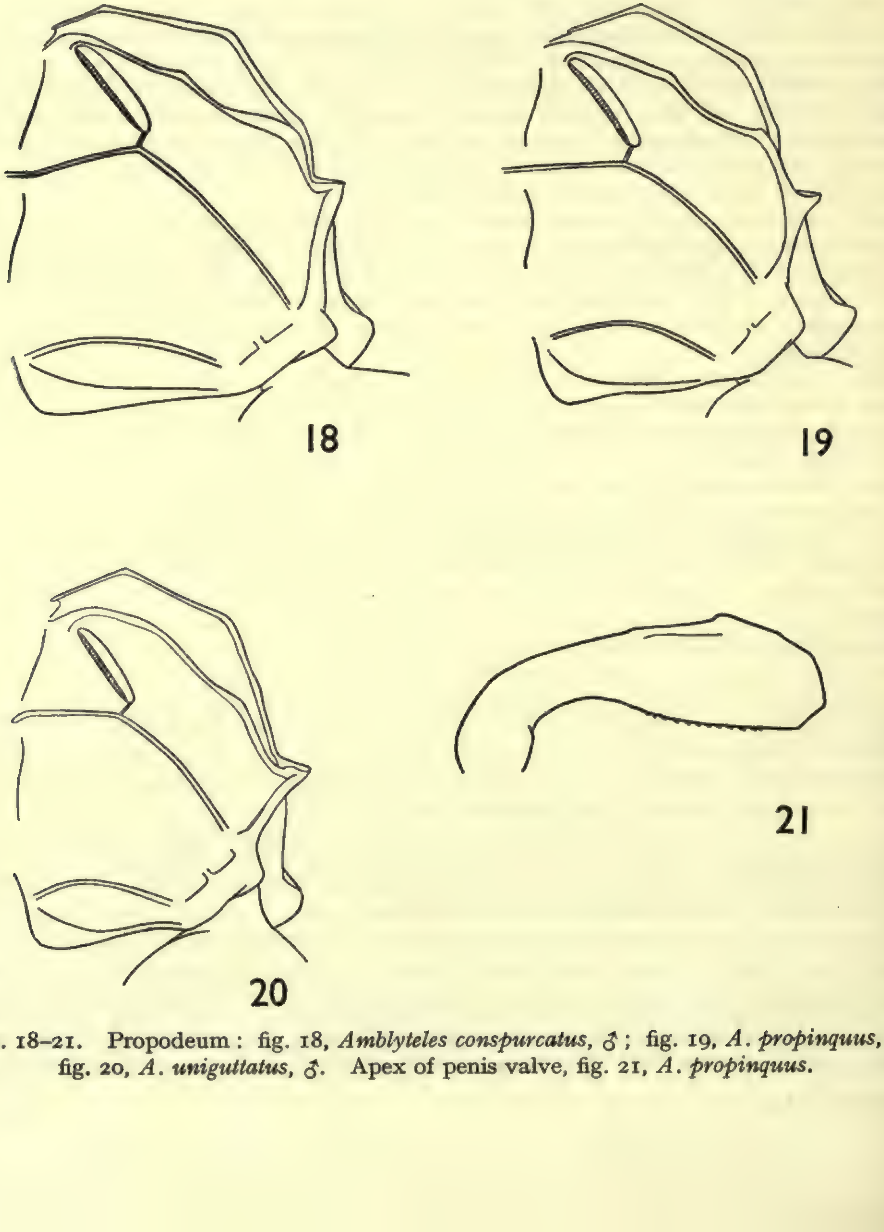
PARATYPES. SCOTLAND : 1♀, Sutherland ; R. Traligal, Glen Dubh, 19.vi.1948 (*J. Balfour-Browne*). IRELAND : 1♂, same data as allotype. (B.M.Coll.) SWEDEN : 1♀. (Thomson Coll., Lund University Museum).

This species is closely related to *simplicidens* (Thomson) and agrees with it in the form of the mandible, but *simplicidens* differs in having the basal flagellar segments more elongate (post-anellus length : breadth about 1·6 : 1, 4th antennal segment about 1·3 : 1), the hypostomal carina a little less raised, the post-petiole more coarsely striate, tergite 3 in greater part fuscous and the legs much more broadly infuscate.

The males from Skåne, Ringsjön, which Thomson had associated with the single female type of *simplicidens* I believe to belong to *celenae.*

Amblyteles (Triptognathus) propinquus sp. nov.

Much confusion has existed in Britain between *Amblyteles uniguttatus* (Gravenhorst) and *conspurcatus* (Gravenhorst) and *Ctenichneumon panzeri* (Wesmael). I have now, however, seen material from England which does belong to the *uniguttatus* group of species with the mandible unidentate, but which appears to be distinct from described species. It may be a subspecies, but this has yet been impossible to determine. I



FIGS. 18–21. Propodeum: fig. 18, *Amblyteles conspurcatus*, ♂; fig. 19, *A. propinquus*, ♂; fig. 20, *A. uniguttatus*, ♂. Apex of penis valve, fig. 21, *A. propinquus*.

have also seen material of the same form in the Wesmael collection, from the dunes near Ostend. Only the male is known to me.

♂. More robust than *uniguttatus*, less robust than *conspurcatus*. Similar to *uniguttatus*, but with the vertex deeply and more sharply impressed behind the ocelli; mesoscutum at least in part a little less closely punctate, the propodeum deeply excised before the dentiparal spines (Fig. 19) (the excision a little less abrupt than in *conspurcatus*); mesopleurum with the speculum clearly punctate (as in *uniguttatus*); thyridiae distinct but small, in breadth subequal to the length of the 4th middle tarsal segment (in *uniguttatus* broader than this; in *conspurcatus* the thyridiae absent).

Colour: black; clypeus sometimes with an ivory spot on each side; pronotum with the collar centrally and the mark in the hind angles ivory; sub-alar callus and scutellum in greater part ivory; gaster with tergites 2–4 testaceous, 4 marked with fuscous; apical tergites and genital claspers not marked with ivory; sternites 2–3 and in part 4, testaceous; front and middle femora red, yellow apically and sometimes dorsally, often marked with black posteriorly and beneath, the tibiae and tarsi pale testaceous, the tarsi in part infuscate; hind coxa sometimes with an ivory, dorsal mark, hind femur red, varying to black but most usually retaining a yellow dorsal stripe (in the darkest specimen seen the femur is black with a reddish dorsal stripe), hind tibia testaceous, narrowly infuscate apically, in dark specimens with the fuscous markings more extensive, hind tarsus fuscous, usually pale at the base; wings weakly smoky, darker apically, with the costal vein fuscous becoming testaceous in basal ½, stigma testaceous, margined with fuscous.

Penis valves similar to those of *uniguttatus* and *conspurcatus* (Fig. 21).

Length: 16–18 mm.

HOLOTYPE. ♂. Hym. 3b 1825. ENGLAND: Cambs; Croydon, 17.vi.1945 (*C. E. Tottenham*). (B.M.Coll.)

PARATYPES. ENGLAND: Cambs; 5♂, Croydon, 17–23.vi.1945. (*C. E. Tottenham*). Suffolk; Sudbury, Gull Lane, 17.vii.1922 (*P. Harwood*). (B.M.Coll.)

Platylabus stolidus sp. nov.

This species belongs to the group of *pedatorius* (F.), having the strongly expanded hypostomal carina; it differs from the other species of the group that are known to me in having the temples relatively strongly enlarged.

♀. Head with the temples large, sub-parallel directly behind the eyes (Fig. 22); frons dorsad distinctly punctate; face coarsely punctate, the punctures becoming finer towards the orbits and sub-rugose on the epistoma, the inter-antennal tubercle weak; clypeus closely punctate basally, more sparsely punctate in apical third, little convex (conspicuously flatter than in *pedatorius*); antenna very little widened before the apex, 39 segments, similar to that of *pedatorius*; hypostomal carina broad.

Thorax with the sculpture similar to that of *pedatorius*; the epicnemia not strongly raised; notauli vaguely impressed anteriorly; dentiparal area with no apical tooth; the area superomedia a little transverse; area petiolaris clearly differentiated by lateral carinae, trans-striate-rugose; hind femur rather stout, length : breadth about 3·2 : 1 (of *pedatorius* about 3·7 : 1); hind tarsus with segment 1 a little longer than segments 2 + 3 + 4.

Gaster with segment 1 similar in form and sculpture to that of *pedatorius*; tergite 2 with the distance between the thyridiae a little greater than in *pedatorius* (thyridiae : distance between thyridiae about 1·5 : 1) and a little more oblique than in that species, punctate or rugose between the gastrocoeli and behind the thyridiae, otherwise with clear punctures which become shallow and ill-defined towards the hind margin, covered in coriaceous sculpture as are the following segments; tergite 3 with clear, shallow punctures basally, fading out in the apical third.

Colour: black; malar space apically ivory; frontal orbits marked with yellow, outer orbits sometimes marked with yellow centrally; antenna with segments 10/11–14/15 with an ivory dorsal stripe, scape with a small, yellow, basal spot beneath; mandibles red towards apex; tegulae sometimes marked with pale testaceous; gaster with the apices of the tergites piceous, tergite 2 piceous basally; trochantelli narrowly red apically sometimes in part with piceous markings, that of the front leg pale, sometimes testaceous beneath; front and middle femora and tibiae red, their tarsi fuscous, in part testaceous; hind femur red, distinctly though rather narrowly black apically, hind tibia black, usually red in basal third, hind tarsus black, the segments reddish basally and segments 1 and 2 with a small red apical spot; wings with the costal vein pale testaceous, fuscous apically and the stigma black.

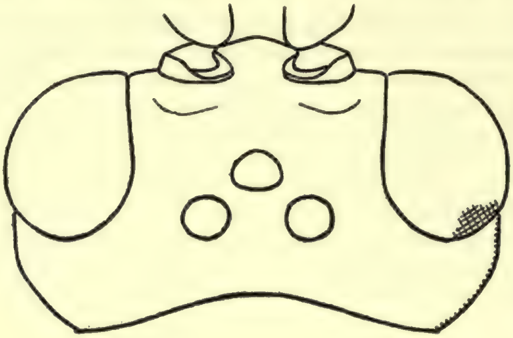


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FIG. 22. *Platylabus stolidus*, ♀: head dorsally.

Length: 9–11 mm.

♂. Unknown.

HOLOTYPE. ♀. Hym. 3b 1826. ENGLAND: Essex; Colchester (*Harwood*). (B.M.Coll.)

PARATYPES. BELGIUM: 1♀, Steinbach, 18.viii.1875; 1♀, Francorchamps, 3.viii.1899 (*Severin*). (Coll. Tosquinet, Brussels Museum).

Differs from *pedatorius* in the broader temples, the black stigma, the black apex to the incrassate femur, the flatter clypeus.

Platylabus odiosus sp. nov.

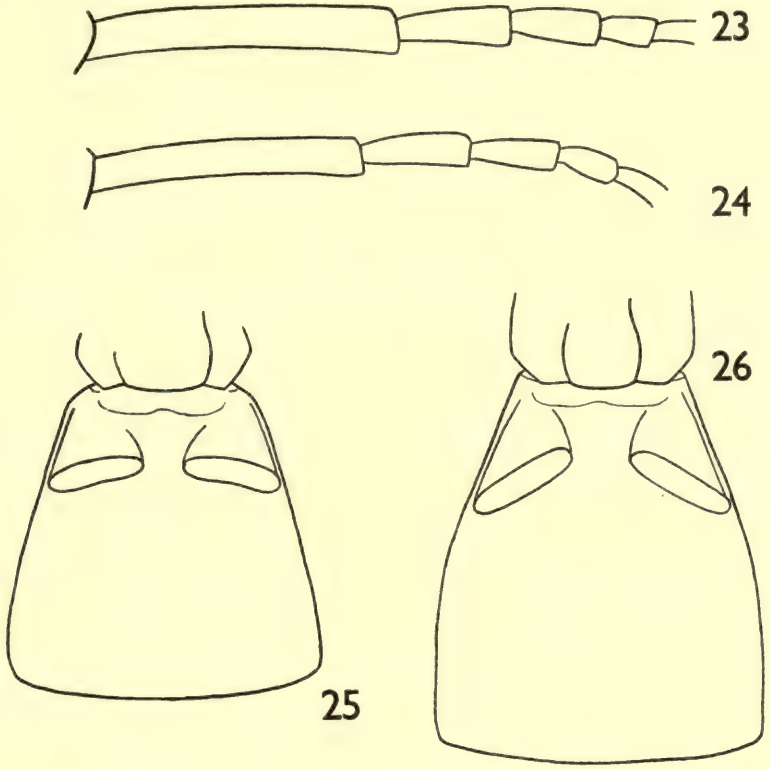
This species belongs to the *pedatorius* (F.) group.

♀. Head with temples strongly narrowed behind the eyes, a little convex; frons, above, coriaceous, with shallow, ill-defined punctures and striae; face strongly punctate becoming rugose-punctate on the epistoma; the inter-antennal tubercle weak; clypeus strongly punctate basally, very sparsely punctate in apical third, convex; antenna hardly widened before the apex, with 39–40 segments; hypostomal carina broad.

Thorax with the puncturation similar to *pedatorius*, but with distinct microsculpture between the punctures on the lateral lobe; the epicnemia not distinctly raised, notauli vaguely impressed anteriorly; dentiparal area with no apical tooth; area superomedia less transverse than in *pedatorius* ; area petiolaris clearly differentiated by lateral carinae, striate-rugose ; hind femur with length : breadth about 3·8 : 1 ; hind tarsus a little thinner than in *pedatorius*, and with segment 1 subequal to segments 2 + 3 + 4 (Fig. 24).

Gaster a little narrower than in *pedatorius*, the 1st segment similar in form to *pedatorius* ; tergite 2 with thyridiae : distance between thyridiae about 2 : 1 (cf. Fig. 26), rugose between the gastrocoeli, otherwise punctate, the punctures becoming very feeble apically, mostly coriaceous, as are the following segments ; tergite 3 with clear, shallow punctures in basal half.

Colour : black ; apex of malar space ivory, frontal orbits and usually external orbits centrally, yellow ; antenna with segments 11/12–14/15 with an ivory dorsal stripe, the scape sometimes yellowish basally, beneath ; mandibles red towards apex ; scutellum towards apex and usually post-scutellum, marked with yellow ; tegula usually marked with yellow ; gaster with the tergites somewhat piceous apically, tergite 2 also piceous basally ; sternites in part somewhat piceous marked ; trochanters very narrowly reddish apically ; front and middle trochantelli, femora, tibiae and tarsi red, the tarsi in part somewhat infuscate ; hind trochantellus in part red, femur red, rarely with an extremely narrow fuscous mark apically, tibia black, red in basal third, tarsus black, with the bases of the segments usually more or less reddish and segments 1 and 2 with a small, dorsal, apical, red spot ; wings with the costal vein pale testaceous, fuscous apically, stigma black.



FIGS. 23–26. Hind tarsal segments 1–4 : fig. 23, *Platylabus pedatorius*, ♀ ; fig. 24, *P. odiosus*, ♀. Tergite 2 : fig. 25, *P. pedatorius*, ♂ ; fig. 26, *P. odiosus*, ♂.

♂. Similar to the ♀ but more slender, the punctures of the abdomen deeper and more distinct, the 1st segment of hind tarsus shorter than segments 2 + 3 + 4 ; the face and clypeus marked with yellow, the antenna with no white stripe above, the scape broadly yellow beneath, the femur narrowly fuscous apically.

Length : ♂ 10 mm., ♀ 8–10 mm.

HOLOTYPE. ♀. Hym. 3b 1827. ENGLAND : Devon ; Newton Abbot, 8.x.1941 (*R. C. L. Perkins*). (B.M.Coll.)

ALLOTYPE. ♂. BRITISH ISLES (*T. A. Marshall*). (B.M.Coll.)

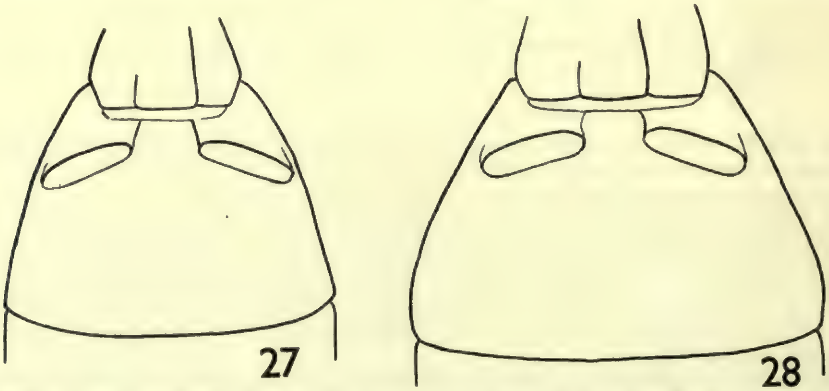
PARATYPES. ENGLAND : 4♀, Cornwall ; Botusfleming (*T. A. Marshall*) ; 1♀ (*Cameron*) ; 1♀ (*Capron*). GERMANY : 2♀, Apfl., 14.viii. (*Buchecher*). (B.M.Coll.)

This species has the interspaces between the punctures on the mesoscutum less strongly coriaceous than in the *opaculus* Thomson group, and also has the hypostomal carina strongly raised as in *pedatorius*. It differs from *pedatorius* in the sculpture of the mesoscutum, the black stigma and the different proportions of the hind tarsus (in *pedatorius* ♀, tarsus 1 is distinctly longer than 2 + 3 + 4).

Cyclolabus dubiosus sp. nov.

The species related to *pactor* (Wesmael) are most obscure, and it is possible that more than two species (*pactor* and *dubiosus*) occur in the British Isles. In dealing with our species I have felt it necessary, however, to distinguish this species from *pactor*. I give the differences in the form of a table. I have examined the syntypes of *pactor* in the Wesmael collection.

pactor (Wesmael).	*dubiosus* sp. nov.
♀♂. Thyridiae very broad ; breadth of thyridia : distance between thyridiae about 1·9 : 1 (Fig. 28).	Thyridiae narrower ; breadth of thyridia : distance between thyridiae about 1·5 : 1 (Fig. 27).
Scutellum at most with the lateral keels present basally.	Scutellum with the lateral keels extending to the middle, where they are inwardly curved.
Area superomedia usually receiving the costula behind, or at the middle.	Area superomedia receiving the costula before the middle.
♀. Lateral lobes of the mesonotum, centrally, polished between the punctures.	Lateral lobes of the mesonotum with surface sculpture between the punctures.
♂. Mesopleurum more sparsely punctate.	Mesopleurum in part sub-rugosely punctate.



FIGS. 27, 28. Tergite 2 : fig. 27, *Cyclolabus dubiosus*, ♀ ; fig. 28, *C. pactor*, ♀.

HOLOTYPE. ♀. Hym. 3b 1828. ENGLAND: Essex; Colchester, 1902 (*Harwood*). (B.M.Coll.)

ALLOTYPE. ♂. ENGLAND: Essex; Colchester, 1903 (*Harwood*). (B.M.Coll.)

PARATYPES. ENGLAND: Glos.; 4♂, Staunton, 4–11.vi.1936 (*E. B. Britton* and *J. F. Perkins*). Essex; Colchester, 2♂ (one *ex Eucymatoge subnotata*) (*Harwood*). Surrey; 1♀, Claygate (*G. C. Champion*). Berks; Ascot, 1♂ *ex Eupithecia goossensiata*, x.1934 (*E. A. Cockayne*). W. Suffolk; 1♀, bred 18.viii.1911 (*C. G. Nurse*). Somerset; Crowcombe, 1♀, *ex Eupithecia expallidata*, 9.vi.1949 (*E. C. P. C.*).

I have seen material of *pactor* bred from *Eupithecia insigniata* and *Eupithecia arceuthata*.

Herpestomus wesmaeli sp. nov.

Related to *nasutus* Wesmael, but with the head and thorax conspicuously dorsoventrally flattened, thus approaching the form found in *Eriplatys ardeicollis* (Wesmael), but less depressed than in that genus, and without the intumescent first segment of the gaster.

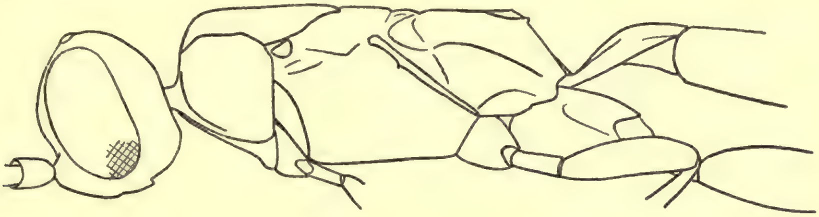


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FIG. 29. *Herpestomus wesmaeli*, ♀: head and thorax laterally.

♀. Head with the temples rather short but strongly convex, the vertex broadly and rather deeply excised, and with the plane of the face almost at right angles to that of the frons, which is not intumescent, and with very small antennal scrobes; malar space about 0·8 times breadth of base of mandible; mandible with the lower tooth small and well removed from the apex of the upper tooth; genal carina meeting the hypostomal carina at a distance from the base of the mandible which is less than the malar space; frons closely punctate, tending to striate-punctate, particularly ventrad; vertex finely punctate, becoming more finely and more remotely punctate on the temples; face closely punctate, becoming more finely and more closely punctate on the malar space and with the epistoma convex, sub-quadrate; clypeus with coarser punctures than the face, convex, and with a narrow flattened anterior margin; antenna with 24–26 segments, similar in general form to that of *nasutus*.

Thorax distinctly dorso-ventrally flattened (Fig. 29); pronotal groove rather shallow, the collar, centrally, broader than in *nasutus* and with the anterior margin centrally not reflexed, laterally with the furrow transcostate, the hind margin transcostate, punctate dorsad and in the hind angle; mesoscutum with very weak short notauli, clearly punctate, polished between the punctures except on the middle lobe anteriorly; scutellum more finely punctured than the mesoscutum centrally, flattened; mesopleurum punctate, somewhat striate posteriorly, ventrad, the speculum more finely punctate; sternaulus rather shallow, transcostate, extending to about the middle; mesosternum elongate, a little more finely punctate than the mesopleurum, viewed laterally with the lateral margin almost straight from the epicnemia to the hind margin, the prepectus short ; propodeum dorsally flattened with the broad area petiolaris subequal in length to the large, almost pentagonal area superomedia, the area basalis obsolete or absent, the costula short, strong, the area externa narrow, the area spiracularis slightly widening at the costula ; metapleurum punctate with the clearly defined area coxalis rugose ; hind coxa weakly, obliquely transcostate in the dorsal furrow, finely and closely punctate beneath, the punctures becoming a little coarser and a little sparser apically ; front wing with the 2nd intercubital unpigmented ; hind wing with the nervellus antefurcal.

Gaster with 1st segment rather short, similar to that of *nasutus*, with distinct, somewhat coarse punctures extending almost from the base nearly to the apex and sometimes, in part, somewhat striate ; tergite 2 with rather broad thyridiae, breadth of a thyridiae : distance between thyridiae about 1·5 : 1, gastrocoeli rather short, rugose, the segment otherwise clearly punctate, the punctures obsolete apically, in far the greater part with no microsculpture between the punctures ; tergite 3 with the punctures similar in size to those of tergite 2, obsolete apically ; tergite 4 a little more finely and less deeply punctate, the punctures obsolete in apical half.

Colour : black ; usually with the epistoma yellow-marked dorsally, and the face with a yellow spot between the antennal sockets, and the orbit, epistoma, clypeus and apex of malar space often piceous or reddish ; mandible in part reddish ; antenna with the scape, in part, reddish beneath, basal flagellar segments sometimes in part piceous beneath ; pronotal collar, centrally, sometimes yellow or red marked ; tegula yellow marked posteriorly ; coxae black, trochanters narrowly yellowish apically, trochantelli reddish, in part yellowish, rest of the legs reddish, marked with fuscous, the hind legs more extensively fuscous than the front ones, varying to the legs almost completely infuscate ; tergites 2–4 piceous, darker centrally, varying to almost completely black with only the apices of the segments red.

♂. Similar to the ♀ but narrower ; antenna with 23–24 segments, without tyloidae ; scape and pedicel marked with yellow beneath, face and clypeus yellow, mandibles in greater part yellow ; pronotal collar often marked with yellow centrally ; hind angle of pronotum usually marked with yellow ; sub-alar callus usually marked with yellow ; tegula yellow ; front and middle coxae and trochanters conspicuously marked with yellow, otherwise the legs similarly coloured to ♀ ; tergites black with the apices of the segments (except 1) narrowly yellow.

Length : ♂ 4 mm., ♀ 4–5 mm.

HOLOTYPE. ♀. Hym. 3b 1829. ENGLAND : Bucks ; Brickhill, 8.vii.1938 (*R. B. Benson*). (B.M.Coll.)

ALLOTYPE. ♂. Same data as type. (B.M.Coll.)

PARATYPES. 2♂ 1♀, same data as type (B.M.Coll.) Suffolk ; 1♀, Barton Mills, fir, 5.vi.1916 (*C. Morley*). (C. Morley Coll.) IRELAND : Co. Kildare ; 1♀ (*A. W. Stelfox*). (A. W. Stelfox Coll.)

Dicaelotus fitchi sp. nov.

This species belongs to the *pumilus* (Gravenhorst) group (Group A, Thomson, 1891, *Opusc. Ent.* **15** : 1618).

♀. Head with the temples sub-parallel directly behind the eyes, strongly convex ; malar space very short, the length about one-third of the breadth of base of mandible (Fig. 30), the genal carina almost straight, meeting the hypostomal carina at a distance from the base of the mandible about equal to half the breadth of base of mandible ; frons, dorsad, with the clear punctures in the main twice as far from each other as the diameter of the punctures, the vertex and temples with finer punctures, the frons, ventrad, trans-striate ; face with the epistoma very short and transverse and strongly convex, divided from the clypeus by a distinct epistomal groove ; face striate-punctate beside the sparsely punctate epistoma, and becoming sparsely punctate towards the orbits ; clypeus broad, a little convex, very weakly, broadly projecting centrally apically, basally with rather coarse, sparse punctures ; antenna with 25–26 segments ; basal segments of flagellum very short, post-anellus sub-quadrate, segment 2 a little elongate, 3 sub-quadrate.

Thorax : pronotum centrally with only a faint indication of the transverse groove, laterally with the furrow trans-striate (as is the posterior margin in greater part), dorsad punctate, the collar punctate ; mesoscutum with the notauli present anteriorly, clearly punctate, polished between the punctures except on the central lobe anteriorly ; scutellum more finely, more closely punctate, usually with lateral carinae extending to the middle, the scutellar fovea trans-striate ; mesopleurum coarsely punctate, striate-punctate posteriorly, ventrad, the speculum only punctate dorsad ; sternauli extending to about two-thirds, straight, coarsely trans-striate ; mesosternum much more finely and sparsely punctate, the posterior carina broadly interrupted in front of the middle coxae ; propodeum similar to that of *pumilus* ; hind coxa punctate, striate beneath on the inner margin, outwardly more sparsely punctate apically.

Gaster with post-petiole punctate laterally, sometimes with scattered punctures centrally, apically, but still with a distinct, unpunctured, central area ; tergite 2 (with no gastrocoeli or thyridiae) punctate basally (punctate-striate laterally), the punctures becoming weaker and sparser posteriorly ; tergite 3 with the punctures, basally, similar to those in the middle of tergite 2, becoming obsolete apically ; tergite 4 with indistinct punctures in basal two-thirds ; hind wing with the nervellus antefurcal.

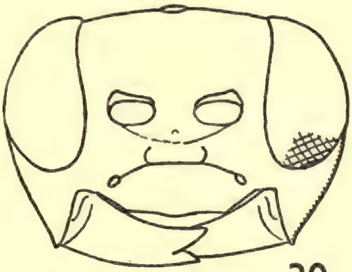
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FIG. 30. *Dicaelotus fitchi*, ♀ : head from in front.

Colour : black ; clypeus red apically ; mandible pale testaceous ; antenna with scape red-marked beneath and basal flagellar segments marked with red ; pronotum usually with the collar red-marked centrally, hind angles usually red-marked ; legs red, the coxae sometimes infuscate basally, and the hind coxa sometimes entirely black ; femora and tibiae sometimes fuscous marked ; hind tarsus sometimes weakly infuscate ; gaster with tergite 1 red laterally and apically ; tergites 2 and 3 red with a pair of central, fuscous spots ; tergite 4 red at the base varying to the tergites all black with only the apices of the segments narrowly red or piceous.

♂. In general similar to the ♀, but the face longer with the epistoma less transverse, the malar space even shorter (conspicuously shorter than in *pumilus*), the hypostomal carina arcuately inflexed, but less strongly so than in *pumilus* ; the punctures generally coarser and closer than in the ♀, gaster with the post-petiole evenly punctate, tergite 4 clearly punctate almost to apex ; antenna with 29 segments, tyloidae on segments 9–16 (those on 15 and 16 small in the single specimen seen).

Colour similar to the ♀, but with the scape yellow beneath, the clypeus entirely yellow, the mandible in greater part yellow (facial orbits with an indication of a yellow mark), pronotum with the collar centrally, and the hind angles marked with yellow, tegula yellow ; front and middle coxae and all the trochanters marked with yellow.

Length : ♂ 6 mm., ♀ 5–6 mm.

HOLOTYPE. ♀. Hym. 3b 1830. BRITISH ISLES: *ex Depressaria apiella* (*Dr. F. B. White*). (Fitch Coll.) This is a specimen with the abdomen little marked with red.

ALLOTYPE. ♂. BRITISH ISLES (*Marshall*). (Fitch Coll.)

PARATYPES. 2♀, same data as Allotype. (Fitch Coll.) ENGLAND: Suffolk; 1♀, Ipswich District, 9.vi.1897 (*C. Morley*). (B.M.Coll.)

I have also examined 3 females which may represent a distinct species, differing from the darkest of the above in having the tibiae fuscous, ivory basally. I have, however been unable to discover any other reliable differences. Two are from IRELAND: Co. Dublin; The Slade of Saggart, 8.vii.1936 (*A. W. Stelfox*) (A. W. Stelfox Coll.), and the third from GERMANY (*Ruthe*) (B.M.Coll.). This latter specimen is very small, being about 3·5 mm. long.

D. fitchi is superficially most similar to *inflexus* Thomson, but differs in the shorter malar space, and the 4th antennal segment being relatively a little shorter.

Dicaelotus suspectus sp. nov.

This species, also, belongs to the *pumilus* (Gravenhorst) group.

♀. Head with the temples sub-parallel directly behind the eyes, strongly convex; malar space moderate, about 0·6 times the breadth of base of mandible, the genal carina conspicuously incurved; frons coarsely punctate, the scrobes polished, vertex and temples with finer punctures, which are sparser except behind the posterior ocelli; face with the epistoma short, transverse and strongly convex, divided from the clypeus by a strong epistomal groove; epistoma only punctate laterally, the face beside this striate-punctate, the punctures becoming very sparse towards the orbits; clypeus weakly rounded apically, a little convex, sparsely punctate basally; antenna with 25 segments, the post-anellus sub-equal to the following segment and sub-quadrate, the sub-apical segments conspicuously transverse.

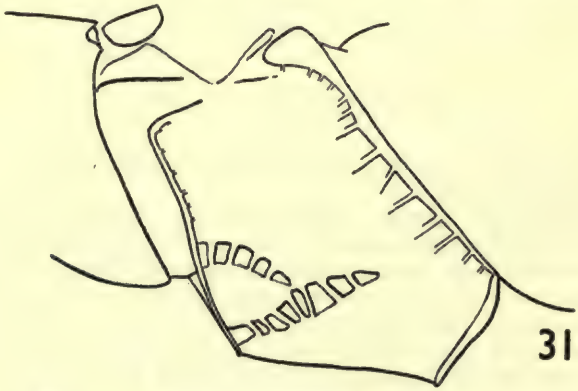


FIG. 31. *Dicaelotus suspectus*, ♀: mesopleurum.

Thorax: pronotum centrally with a weak, transverse groove, laterally with the furrow trans-striate, as in the posterior margin in greater part, punctate dorsad; mesoscutum with the notauli very short but rather deep, clearly, rather sparsely punctate, polished between the punctures except on the median lobe anteriorly; scutellum much more finely and more closely punctate, carinate laterally to about the middle; mesopleurum coarsely punctate anteriorly, punctate-striate posteriorly, ventrad, the speculum finely, sparsely punctate; sternaulus rather broad, coarsely trans-striate, extending to about two-thirds the length of mesopleurum, and with a coarsely trans-striate mesopleural furrow joining it, and extending forward to the epicnemia (Fig. 31); mesosternum more finely and sparsely punctate, the posterior carina at most very narrowly interrupted at the lateral angle; propodeum similar to that of *pumilus*, but the sculpture weaker; hind coxa punctate, the puncture sparser apically.

Gaster with the post-petiole sparsely punctate, usually punctate-striate laterally, apically; tergites 2 and 3 with clear punctures, becoming obsolete apically; the following tergites rather sparsely pubescent; hind wing with the nervellus antefurcal.

Colour: black; clypeus red, usually infuscate basally; mandible with the shaft pale red; antenna with the scape red, infuscate dorsally, pedicel and base of flagellum testaceous or marked with testaceous; tegulae pale testaceous; pronotal collar centrally sometimes marked with pale testaceous; legs red, marked with pale testaceous, hind coxa infuscate at least basally, hind femur usually infuscate at least apically, hind tibia sometimes marked with fuscous apically, apical mid and hind tarsal segments usually infuscate.

Length: 4–5 mm.

♂. Unknown.

HOLOTYPE. ♀. Hym. 3b 1831. ENGLAND: Suffolk; Bentley Woods, 16.vi.1902 (*C. Morley*). (B.M.Coll.)

PARATYPES. ENGLAND: 1♀ (*Capron*). (Morley Coll.) Surrey; 1♀, Bagshot Heath, 20.viii.1934 (*O. W. Richards*). (B.M.Coll.) SWEDEN: Skåne; 1♀, Löderup, 22.vii.1938 (*J. F.* and *D. M. S. Perkins*). (B.M.Coll.)

This species is of considerable interest, as not only does it possess a well-developed sternaulus, but also an oblique furrow running between this and the epicnemia, as is found in certain *Hemiteles* (s.l.). In many Porizonini it appears that the anterior part of the sternaulus is missing, and thus only a " mesopleural furrow " is present, such as is found in many Braconidae. This character, together with the very narrowly interrupted posterior carina of the mesosternum, allows this species to be readily distinguished from all others within the *pumilus* group.

***Epitomus proximus* sp. nov.**

This species is very closely related to *Epitomus parvus* Thomson and therefore I give the description in the form of a comparative table with that species.

proximus	*parvus*
♀♂. Genal sulcus very weakly impressed.	Genal sulcus distinctly impressed.
Gena with coriaceous sculpture behind the genal sulcus.	Gena polished behind the genal sulcus.
Face with rather even coriaceous sculpture laterally.	Face with a polished area above the clypeus towards the genal sulcus.
Head more shallowly impressed along the outer margin of the eye.	Head deeply impressed along the outer margin of the eye.
♂. Lower frontal orbits sometimes conspicuously marked with yellow.	Lower frontal orbits not marked with yellow.
17♂, 18♀, England, Ireland, Sweden.	30♂, 73♀, England, Ireland, Germany, Sweden.

HOLOTYPE. ♀. Hym. 3b 1832. ENGLAND: Glos; Forest of Dean, High Meadow Woods, 9.vi.1936. (*E. B. Britton* and *J. F. Perkins*). (B.M.Coll.)

ALLOTYPE. ♂. IRELAND: Co. Kildare; 29.viii.1937 (*A. W. Stelfox*). (B.M. Coll.)

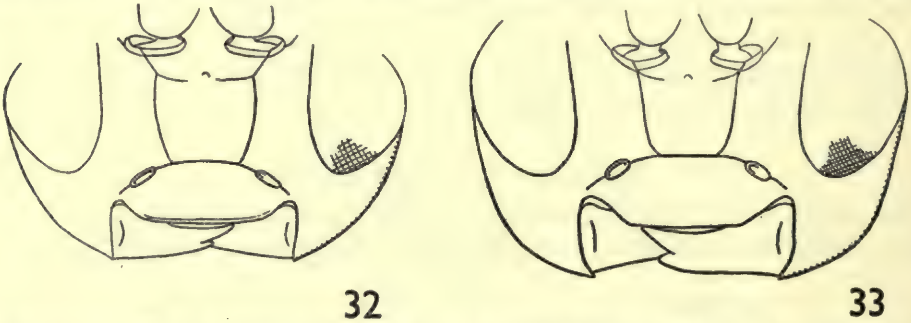
PARATYPES. 16♂, 17♀, ENGLAND, IRELAND, SWEDEN. (B.M.Coll. and A. W. Stelfox Coll.)

The form of the genal sulcus is usually a good character in separating species of Ichneumonidae, and it is for this reason that I have retained these forms as distinct, in spite of the paucity of other characters.

Mevesia guttata sp. nov.

Agreeing with *arguta* (Wesmael) in the form of the genal carina, which in both meets the hypostomal carina directly behind the base of the mandible, the large, deep clypeal pits, and also in having no white band on the flagellum; it differs from *arguta* in having the clypeus inflexed apically but with no flattened apical margin, the notauli very short, the frons more weakly intumescent, the petiolar area less strongly excavate, the genae more finely punctate ventrad, posteriorly, the abdomen with more distinct sculpture though strongly shining and with more distinct, large, sparse punctures; the male is more strongly sculptured than the female.

♀. Head with the temples sub-parallel behind the eyes and then broadly rounded to the vertical carina; frons and vertex closely punctate and in part coriaceous, the punctures becoming finer and sparse and with no microsculpture on the temples and very sparse on the genae; antennal scrobes trans-striate; face with the epistoma weakly convex and slightly elongate, more finely and more remotely punctured than the frons, the punctures becoming sparser on the face, laterally; clypeus convex, inflexed apically, with weak microsculpture and remotely punctate, and clearly separated from the epistoma (Fig. 33); malar space coriaceous and sparsely punctate, about half as long as breadth of base of mandible; antenna with 19–20 segments, the basal flagellar segments elongate, becoming sub-quadrate, quadrate at the 11th segment, the post-anellus with length : breadth about 2·5 : 1.



FIGS. 32, 33. Face to show clypeus: fig. 32, *Mevesia arguta*, ♀; fig. 33, *M. guttata*, ♀.

Thorax: pronotal collar rather short, the transverse groove deep and somewhat crenulate, the lateral groove and the hind margin striate, becoming punctate towards the upper margin and the hind angle; mesoscutum with the punctures similar to the vertex, but becoming close anteriorly on the middle lobe, where there is microsculpture between the punctures ; notauli deep anteriorly but shorter than in *arguta* : scutellum much more finely and more sparsely punctate than the disc of the mesoscutum ; mesopleurum striate-punctate, the speculum polished, narrowly punctate above ; sternaulus crenulate, extending nearly to the middle ; mesosternum finely, closely, shallowly punctate ; propodeum with the basal groove narrowed centrally, but broad on either side of the projection ; area superomedia finely rugose, little transverse, rounded anteriorly, receiving the distinct costula at about the middle ; all the areae enclosed except the basal area ; area interna punctate-rugose, area dentipara rugose, area spiracularis rugose-striate, area petiolaris punctate-rugose, distinctly separated from the coarsely rugose areae externae, moderately excised ; metapleurum with the area coxalis clearly delimited, striate-rugose ; hind coxa with the dorsal groove obliquely striate, closely punctate laterally, the punctures becoming sparser apically, and somewhat weakly striate on the inner margin, beneath.

Gaster somewhat compressed apically ; with the post-petiole coriaceous, sometimes with the coriaceous sculpture tending to run into longitudinal striae, and with very sparse, coarse punctures, the extreme apex polished, no delimited central area ; tergite 2 with very broad thyridiae which are rather narrowly separated centrally, coriaceous, with the sculpture becoming obsolescent apically and with scattered punctures ; the sculpture of the following tergites similar in kind to that of the 2nd, but much weaker ; of the 5th and following tergite very weak indeed ; hind wing with the nervellus opposite.

Colour : black ; clypeus piceous, pale testaceous apically, mandible yellow with the teeth piceous, flagellum dull testaceous, fuscous above, basally ; pronotal collar marked with piceous centrally and laterally, hind angle yellow marked, tegula yellow ; legs red with the coxae black, the front coxa marked with pale testaceous beneath, the middle coxa narrowly pale marked apically, the trochanters infuscate dorsally, the femora sometimes more or less infuscate and the tarsi infuscate apically ; gaster with the extreme apex of tergite 1 piceous to pale testaceous ; tergite 2 testaceous with sub-apical, fuscous spots or band, which laterally join the lateral basal stripe, somewhat infuscate basally ; tergite 3 with sub-apical spots or band ; tergite 4 fuscous with a basal and apical testaceous band, the following segments more or less piceous apically ; wings hyaline.

♂. In general similar to the ♀, but with the sculpture of the abdomen (which is not compressed apically) more distinct ; malar space shorter than in the ♀ (about one-third breadth of base of mandible) ; antenna with 22 segments, with rather small tyloidae on segments 9–11 ; propodeum a little shorter, more coarsely sculptured and with the carina a little more strongly raised than in the ♀.

Colour ; antenna black or fuscous, yellowish beneath apically ; face and clypeus yellow, the genae not marked with yellow ; hind angle of pronotum marked with yellow, tegula yellow ; front and middle coxae mostly yellow, trochanters and trochantelli yellow, femora pale testaceous, very finely marked with light fuscous, tarsi pale testaceous, infuscate apically ; hind coxa with a yellow apical spot, trochanter and trochantellus yellow, femur fuscous, somewhat testaceous basally, tibia and tarsus infuscate, the tibia darker basally and apically ; gaster with the thyridiae, which extend almost completely across the segment, yellow ; tergite 1 narrowly testaceous apically, tergite 2 testaceous apically, tergite 3 testaceous basally and apically, tergite 4 testaceous apically ; the following tergites more or less testaceous apically.

Length : ♂ 6 mm., ♀ 5–6 mm.

HOLOTYPE. ♀. Hym. 3b 1833. ENGLAND : Suffolk ; Monks Soham, 8.v.1911 (*C. Morley*) (B.M.Coll.) (Previously det. as *Diadromus collaris*.)

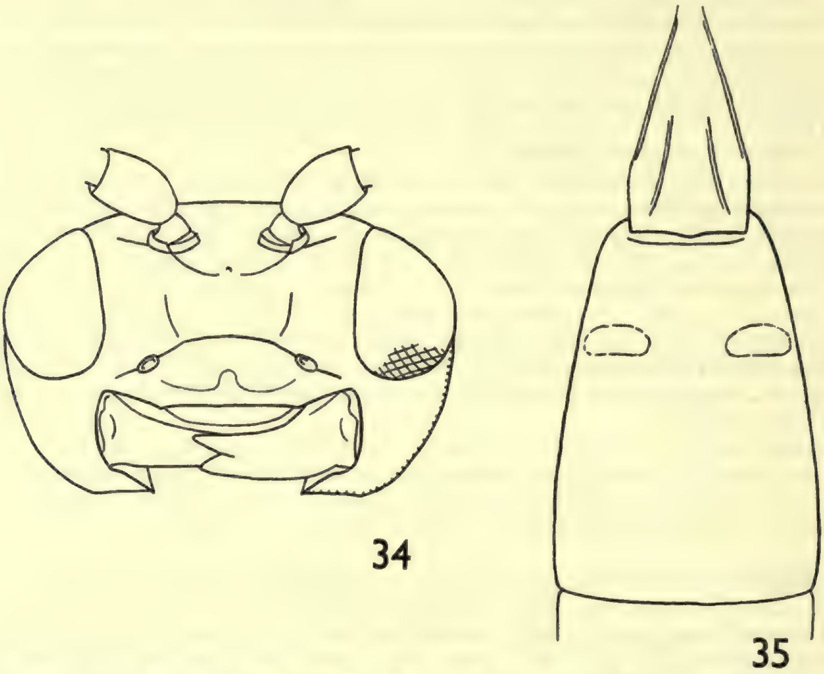
ALLOTYPE. ♂. ENGLAND : Capron Coll. (B.M.Coll.)

PARATYPES. ENGLAND : Herts ; Tring, 1♀, 2.v.1937 (*R. B. Benson*). (B.M. Coll.) 1♀, 1052 (*J. B. Bridgman*). (Previously det. as *macilentus* Wesmael.) (Norwich Museum.)

PARAETHECERUS gen. nov. (Phaeogenini)

The single known species is elongate and of the general facies of *Micrope* Thomson.

Head with the mandibles bidentate, the shaft with the sides sub-parallel, and the lower tooth a little smaller and not far removed from the upper tooth ; frons coriaceous with scattered punctures, with no antennal scrobes ; face somewhat inflexed, the epistoma sub-quadrate and clearly divided from the clypeus by a rather deep groove ; genal carina meeting the hypostomal carina (which is not very strongly raised) at a distance from the base of the mandible ; gena not excavate posteriorly ; clypeus strongly produced in the centre, with a wide excision in the lower margin of this protuberance, the apical margin flattened (Fig. 34) ; the face and malar space short ; antenna weakly clavate, the scape not expanded basally nor flared apically.



FIGS. 34, 35. *Paraethecerus elongatus*, ♀ : fig. 34, face to show clypeus ; fig. 35, tergites 1 and 2 of gaster.

Thorax with a long pronotal collar ; mesoscutum with short, weak notauli ; mesosternum flattened, the sternauli reaching to about one-third the length of the mesosternum ; posterior carina of mesosternum narrowly, but distinctly interrupted at the lateral angle ; propodeum with a distinct dorsal and apical face, the area superomedia closed posteriorly, and the general sculpture of the propodeum becoming rugose ; legs with the claws simple ; wings rather narrow, front wing with the 2nd intercubital vein present but unpigmented, hind wing with the nervellus postfurcal.

Gaster somewhat clavate ; tergite 1 not intumescent and not punctate ; thyridiae large and distinct, well removed from the base of tergite 2, the gastrocoeli undifferentiated (Fig. 35) ; ovipositor sheaths rather broad and a little exserted ; the hypopygium, apically, well removed from the apex of the ovipositor.

Only the ♀ known.

Type species *Paraethecerus elongatus* sp. nov.

Differs from *Aethecerus* in the form of the frons, scape and gena. In general facies and in the form of the frons, similar to *Micrope*, but that genus has an evenly convex clypeus and a more elongate and less inflexed face and longer malar space, and a strong, complete posterior carina of the mesosternum. *Paraethecerus* also has a resemblance to *Centeterus* and *Eparces* in general form, but differs in the clypeus and in the strong thyridiae.

Paraethecerus elongatus sp. nov.

♀. Head with the temples parallel behind the eyes, rather long and convex ; face coriaceous with scattered punctures and tending to striation beneath the antennal sockets ; clypeus with coarse punctures basally ; genae and temples in greater part coriaceous, with scattered punctures ; antenna with 17–18 segments, segment 3 a little shorter than 4 (3, length : breadth about 1·8 : 1 ; 4, length : breadth about 2 : 1).

Thorax : pronotum laterally with the groove weakly striate, evenly striate posteriorly, coriaceous dorsad with fine, indistinct punctures ; mesoscutum clearly punctate, the punctures sparser in the middle of the lateral lobes, with sculpture between the punctures on the central lobe and on the disc ; scutellum more finely and less closely punctate than on the disc of the mesoscutum, polished between the punctures ; mesopleurum more closely and more coarsely punctate, the speculum punctate, a little more finely and less closely punctate on the mesosternum ; propodeum with the area superomedia pentagonal, 1·6 to 2 times as long as broad at the junction with the more or less distinct costulae, which are received before the middle ; the lateral carinae erased at least posteriorly ; metapleurum coarsely, very closely punctate, the coxal area not differentiated ; petiolar area not or rather weakly differentiated from the areae laterales ; hind femur about 3·8 times as long as broad ; hind coxa punctate, the punctures sparser apically, clear on the lower, inner margin, the dorsal groove coriaceous.

Gaster with the tergites coriaceous, the sculpture becoming very weak on tergites 5–7, tergites 2–4 with scattered punctures ; post-petiole with the central area more or less indicated.

Colour : black ; clypeus in part red, mandibles in greater part pale testaceous, antenna testaceous, infuscate apically, sometimes also fuscous marked above, basally ; pronotum sometimes with the collar red marked, hind angles sometimes red marked, apex of prosternum sometimes red marked, tegula pale testaceous ; legs red, coxae sometimes infuscate basally, middle and hind tibiae narrowly infuscate basally and apically, hind femur infuscate apically, the tarsi with the apical segment infuscate.

Length : 5 mm.

♂ unknown.

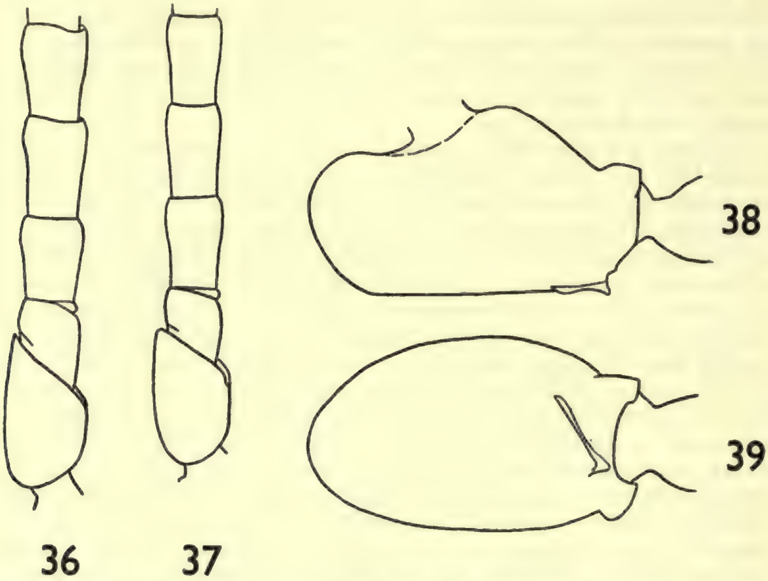
HOLOTYPE. ♀. Hym. 3b 1834. ENGLAND : Suffolk ; Brandon, 7.vi.1903 (*C. Morley*). (B.M.Coll.) (det. as *Aethecerus longulus* Wesmael by C. Morley.)

PARATYPE. ♀. GERMANY (*Ruthe*). (B.M.Coll.)

Phaeogenes foveolatus sp. nov.

This species belongs to the *Phaeogenes fulvitarsis* group (section F. of Thomson), and is most closely related to *fulvitarsis* Wesmael (syn. *ruficoxa* Thomson) and *rusticatus* Wesmael (syn. *fulvitarsis* auctt. angl.) ; it is probably the species that Thomson determined as *rusticatus*. It differs from *fulvitarsis* in having the inner tooth of the carina of the hind coxa arising distinctly before the hind margin, the 4th segment of the antenna a little shorter than the distance between the posterior ocelli, the flagellum stouter, and the notauli at most faintly indicated behind the pit on the anterior margin of the mesoscutum.

♀. Head with the temples roundedly narrowed behind the eyes ; hind ocellus about twice as far from the occipital carina as its greatest diameter ; frons with the antennal scrobes weakly, obliquely striate, clearly punctate dorsad and on the vertex, the punctures sparser on the temples ; epistoma convex, not sharply differentiated from the rest of the face, punctate, the punctures becoming sparser towards the orbits ; gena more clearly punctate than the temples, malar space in part coriaceous and punctate, about half as long as breadth of base of mandible ; clypeus convex, with a sub-apical ridge which is interrupted centrally by punctures and coriaceous sculpture (as in all species of this group) ; hypostomal carina strongly raised, the genal carina meeting this at a distance behind the base of the mandible less than the length of the malar space ; gena not excavate ; antenna somewhat stout apically, the post-anellus at most equal to the distance between the posterior ocelli (Fig. 36) ; antenna with 23–25 segments (24 in 9 out of 14 specimens).



FIGS. 36–39. Basal antennal segments : fig. 36, *Phaeogenes foveolatus*, ♀ ; fig. 37, *P. fulvitarsis*, ♀. Hind coxa of *P. foveolatus*, ♀ : fig. 38, lateral ; fig. 39, ventral.

Thorax : pronotal collar well developed, the transverse groove distinct, the lateral groove and the lower part of the hind margin striate, above this rather coarsely punctate ; notauli represented by a deep anterior pit, behind this rarely with a very short, hardly traceable impression ; mesoscutum with rather coarse, clear punctures on the disc, more finely and sparsely punctate on the lateral lobes ; scutellum a little more finely punctate than the disc of the mesoscutum, more coarsely punctate than the lateral lobes ; mesopleurum punctate, becoming punctate-striate behind, the speculum for the most part with sparse, rather coarse punctures ; sternauli shallow and inconspicuously crenulate, hardly extending to half ; mesosternum more finely punctured than the pleurum ; propodeum with all the areae distinct, the area superomedia elongate, hexagonal, receiving the costula well before the middle, weakly rugose ; area interna and area dentipara weakly rugose and punctate, area petiolaris trans-striate-punctate, aera externa rugose, area spiracularis striate-punctate ; metapleurum punctate, striate in part ; hind coxa with an oblique, sub-apical carina, which is very weakly, broadly raised externally, and more sharply raised internally, the area before the carina very finely punctate with only a faint indication of oblique striation (Figs. 38–39).

Gaster with the post-petiole weakly coriaceous in part, sometimes in part longitudinally striate, and sometimes with a few scattered punctures ; thyridiae broad, and about as far from the base of the 2nd tergite as their length ; tergites 2 and 3 coriaceous with few, widely scattered punctures ; tergite 4 similarly but more weakly sculptured, the following segments becoming progressively smoother ; hind wing with the nervellus opposite, or slightly postfurcal.

Colour : black ; mandibles pale testaceous except for the teeth ; antenna with the scape and pedicel black, varying to broadly testaceous beneath ; 3 or 4 basal flagellar segments testaceous ; a white stripe usually on antennal segments 9–12, sometimes reduced, and in 2 German specimens on segments 8–12 ; legs red, pale testaceous in part, the hind femur and sometimes the hind coxa infuscate apically, the hind tibia rather narrowly infuscate basally and apically, and the apical tarsal segments infuscate ; gaster with tergite 1 narrowly pale apically ; tergites 3–5 entirely red, the following segments narrowly piceous apically.

♂. Similar to the ♀ in general sculpture, and also with the notauli only clearly represented by the anterior pit ; antenna with 27 segments, tyloidae on segments 10–13/14, the basal segments a little shorter than in *rusticatus* ; clypeus marked with yellow ; legs similar in colour to those of the ♀ but the coxae and hind trochanter can be extensively black marked, and the hind tarsus is fuscous, with the basal segments narrowly pale basally ; gaster with only the apices of the central segments narrowly testaceous, and more strongly coriaceous and punctate than in the ♀.

Length : ♂ 5 mm. ; ♀ 5–6 mm.

HOLOTYPE. ♀. Hym. 3b 1835. ENGLAND : Surrey ; Boxhill, 9.v.1891 (*T. R. Billups*). (B.M.Coll.)

ALLOTYPE. ♂. ENGLAND : Surrey ; Horsley, 24.vii.1949 (*J. F. Perkins*) (B.M.Coll.)

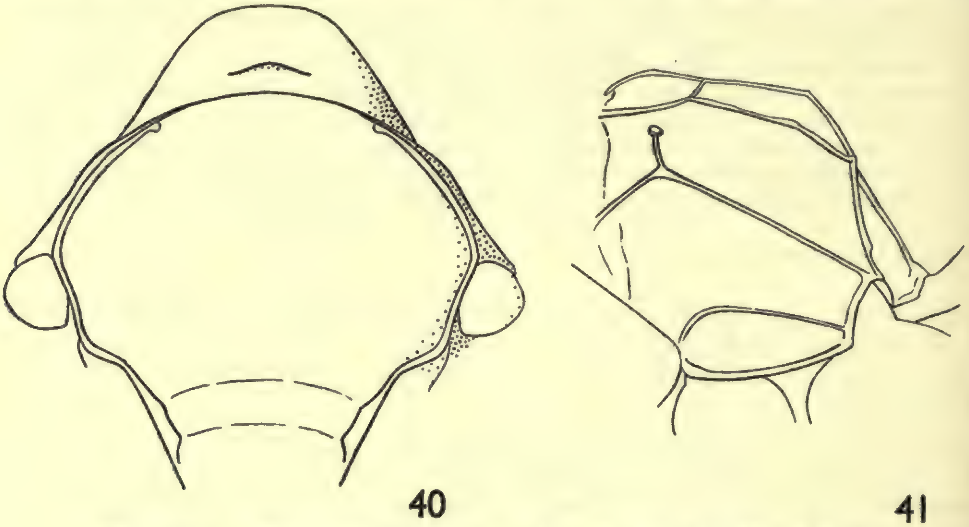
PARATYPES. ENGLAND : Kent ; Deal, 4♀, 2.viii.1880 ; 1♀, 8.viii.1880 (*T. R. Billups*) ; Surrey ; 1♂, same data as allotype. SCOTLAND : Inverness ; Aviemore, 1♀, 4.vi.1952 (*R. B. Benson*). IRELAND : Co. Dublin ; Slade of Saggart, 1♀, 4.x.1936 (*A. W. Stelfox*) ; Co. Wicklow ; Dunran, 1♀, 25.v.1937 (*A. W. Stelfox*). SWEDEN : Skåne ; Ringsjön, 1♀, 4.vi.1938 (*J. F. Perkins*). GERMANY : 3♀ (*Ruthe*). (B.M.Coll.) FINLAND : Kuusamo ; Paanajärvi Rajala, 1♀, 5.vii.1935, beaten from *Picea* (*G. J. Kerrich*). (Helsinki Museum.)

Phaeogenes (Proscus) coriaceus sp. nov.

Similar to *elongatus* Thomson, but differing in the more coarsely coriaceous sculpture of the gaster, with only sparse punctures on the 2nd tergite.

♀. Head with the temples slightly diverging directly behind the eyes, rather strongly convex ; frons and vertex coarsely punctate, the punctures becoming finer on the temples, the antennal scrobes trans-striate ; face with the epistoma convex, punctate at least laterally and dorsad, the rest of the face punctate with the punctures becoming coarser and sparser towards the orbits ; clypeus strongly transverse, sparsely punctate ; hypostomal carina narrow ; lower tooth of mandible a little smaller and shorter than the upper ; antenna with 20–22 segments, the postanellus very slightly shorter than the following segment.

Thorax: pronotum with a broad collar (Fig. 40) centrally with the transverse groove very shallow, the lateral furrow irregularly trans-striate, the posterior margin more or less striate, strongly punctate dorsad; mesoscutum with the notauli very short, rather coarsely punctate, polished between the punctures except on the middle lobe anteriorly; scutellum much more finely punctate than the disc of the mesoscutum; mesopleurum coarsely punctate, punctate-striate anteriorly, ventrad, the speculum with punctures only along the posterior margin; sternaulus crenulate extending almost halfway to the posterior carina; mesosternum more finely punctate, the posterior carina broadly interrupted before the lateral angle; propodeum (Fig. 41) with the area superomedia elongate, hexagonal, receiving the costula well before the middle; all the areae clearly differentiated; basal area with the tubercle distinct, punctate basally becoming rugose laterally and apically, the area superomedia weakly or very weakly, irregularly trans-striate, the area petiolaris punctate-trans-striate and the area coxalis punctate; hind coxa with the dorsal furrow almost devoid of sculpture, rugose dorsally at the base, punctate outwardly and beneath, the punctures becoming a little coarser and sparser apically and finer on the inner margin, unarmed; hind femur about three times as long as broad; wings with the nervellus postfurcal.



FIGS. 40, 41. *Phaeogenes coriaceus*, ♀: fig. 40, thorax dorsally to show pronotal collar; fig. 41, propodeum laterally.

Gaster with the post-petiole more or less coriaceous and longitudinally striate; tergites 2 and 3 very strongly coriaceous, 2 with sparse punctures, 3 with punctures closer, basally; tergite 4 a little less strongly coriaceous and with the punctures similar, though weaker, to those on 3; the following tergites weakly coriaceous, 5 and 6 weakly punctate basally.

Colour: black; face usually with a yellow spot on the lower, outer part of the antennal socket, sometimes also marked with red laterally; clypeus red apically, often ivory in the lateral angles; mandibles in large part pale testaceous; scape sometimes reddish beneath, basal flagellar segments more or less marked with red, segments 11 and 12 sometimes white marked; thorax with the pronotal collar more or less marked with red or yellow centrally, tegula pale testaceous; legs red, with the front and/or middle coxae infuscate basally, hind coxa usually black basally; the trochanters often in part more or less yellow, hind trochanter sometimes infuscate; hind femur infuscate apically, hind tibia infuscate at base and apex; tarsi with the apical segment infuscate and on the hind leg usually with all the segments more or less fuscous marked ; wings hyaline, very weakly smoky apically, the stigma black ; gaster with the apex of tergite 1 and tergites 2–4 red, the following tergites piceous apically.

♂. Similar to the ♀, but with the temples less broad, the face longer and the epistoma hardly differentiated, the malar space shorter ; antenna with 26 segments, segments 7–15 with large tyloidae ; thorax less elongate ; hind femur a little thinner (length : breadth about 3·4 : 1) ; gaster with the post-petiole shining, more rugose.

Face, clypeus and malar space yellow ; scape and pedicel yellow marked beneath, flagellum fuscous, yellowish beneath ; front and middle coxae and trochanters yellow, the femora and tibiae marked with yellow ; hind coxa black basally though red to yellow apically, hind trochanter and trochantellus yellow, hind femur not fuscous apically ; gaster with tergites 2, 3 and 4 black or fuscous marked dorsally.

Length : ♂ 7 mm., ♀ 5–7 mm.

HOLOTYPE. ♀. Hym. 3b 1836. ENGLAND : Hants ; New Forest, Denny, on dead beech 6.vi.1934 (*C. Morley*). (B.M.Coll.) (*Aethecerus dispar* Wesmael det. C. Morley.)

ALLOTYPE. ♂. ENGLAND : Hants ; New Forest, Denny wood, on dead beech, 7.vii.1940 (*C. Morley*). (B.M.Coll.) (*Centeterus opprimator* Gravenhorst det. C. Morley).

PARATYPES. ENGLAND : Hants ; New Forest, 1♀, 17.vii.38 (*Phaeogenes suspicax* det. C. Morley) ; 1♀, 9.vi.1934 (*Aethecerus dispar* det. C. Morley) (*C. Morley*). (C. Morley Coll.) GERMANY : 1♀, (*Ruthe*). (B.M.Coll.)

XII. CHECK LIST OF BRITISH ICHNEUMONINAE

The changes to the British List of Ichneumoninae, which have been dealt with in the preceding pages, are here brought together. So many points remain unsolved that this list can, at most, be considered as a basis for further change. There are also certain matters which should be made clear. I have used *Amblyteles* in the sense of Thomson and have not accepted the segregates that are recognized by Heinrich. I have examined the male genitalia of those European and North American species which are available to me for dissection and find that in some cases these show quite striking group characters ; however, in certain of these groups I have so far been unable to correlate the differences with other satisfactory characters, so I prefer to place the species in one genus as they all have a number of characters in common, and to wait for a much wider investigation before accepting the segregates. It should, perhaps, be pointed out that under *Triptognathus* other workers have assembled two quite divergent elements ; and that the male genitalia of *Amblyteles subsericans* and *elongatus* are essentially similar, though showing also the only reliable differences of which I know for separating the males of these two species, so that either both have to be included in *Limerodops* or both retained in *Amblyteles*.

Certain placements of genera within tribes are obviously unsatisfactory ; *Hypomecus*, *Apaeleticus*, *Goedartia*, *Hepiopelmus* and *Acolobus* I have retained in the tribes in which they have been placed by recent authors ; *Tricholabus*, which seems to me to be a completely anomalous genus, I have included in the Ichneumonini. The Phaeogenini, too, contains very diverse elements, and are grouped together on very superficial characters. I have also retained the Heresiarchini as a separate tribe ; if these are placed in the Protichneumonini as Heinrich has proposed, then this latter name will be a synonym of Heresiarchini, though the position concerning the names of the higher categories has not yet been completely clarified by the International Commission on Nomenclature.

It will be seen that a few dates, particularly earlier ones, differ from those given in Kloet and Hincks' list ; in these cases I have followed the findings of Sherborn. In addition to this, I have accepted the date of Holmgren's fascicle on Phaeogenini as being 1889 as given by Kloet and Hincks, and not 1890 as quoted by Dalla Torre and on the title-page to the complete volume of Holmgren's Ichneumoninae ; Sharp, in the *Zoological Record*, decided, on the evidence available to him, that 1889 was correct.

TROGINI

Trogus Panzer, 1806.
lapidator (Fabricius, 1787).

Psilomastax Tischbein, 1868.
  Cercodinotomus Uchida, 1940.
pyramidalis Tischbein, 1868.
  pictus (Kriechbaumer, 1882).

Callajoppa Cameron, 1903.
cirrogastra (Schrank, 1781).
exaltatoria (Panzer, 1804).

PROTICHNEUMONINI

Protichneumon Thomson, 1893.
pisorius (Linnaeus, 1758).
coqueberti (Wesmael, 1848).
  erythrogaster (Stephens, 1835).
    nec (Gmelin, 1790).

Amblyjoppa Cameron, 1902.
fuscipennis (Wesmael, 1844).
proteus (Christ, 1791).
  laminatoria (Fabricius, 1798).

Coelichneumon Thomson, 1893.
cyaniventris (Wesmael, 1859).
desinatorius (Thunberg, 1822).
  subguttatus (Gravenhorst, 1829).
leucocerus (Gravenhorst, 1820).
falsificus (Wesmael, 1844).
auspex (Mueller, 1776).
nigerrimus (Stephens, 1835).
  derasus (Wesmael, 1844).
bilineatus (Gmelin, 1790).
haemorrhoidalis (Gravenhorst, 1820).
truncatulus (Thomson, 1886).
solutus (Holmgren, 1864).
impressor (Zetterstedt, 1838).
consimilis (Wesmael, 1844).
purpurissatus Perkins, 1953.
  nigrator (Fabricius, 1793).
    nec (Mueller, 1776).
comitator (Linnaeus, 1758).
  ferreus (Gravenhorst, 1829).
microstictus (Gravenhorst, 1829).
serenus (Gravenhorst, 1820).
ruficauda (Wesmael, 1844).
orbitator (Thunberg, 1822).

HERESIARCHINI

Heresiarches Wesmael, 1859.
eudoxius (Wesmael, 1844).

LISTRODROMINI

Neotypus Foerster, 1868.
nobilitator (Gravenhorst, 1807).

Listrodromus Wesmael, 1844.
nycthemerus (Gravenhorst, 1820).

Anisobas Wesmael, 1844.
cingulatorius (Gravenhorst, 1820).
platystylus Thomson, 1888.

ICHNEUMONINI

Hoplismenus Gravenhorst, 1829.
bidentatus (Gmelin, 1790).
  spinosus (Morley, 1903).
  maurus (Marshall, 1873).
  bispinatorius auctt. angl.

Ichneumonini—cont.

albifrons Gravenhorst, 1829.
  armatorius (Fabricius, 1787).
    nec (Forster, 1771).

STENICHNEUMON Thomson, 1893.
culpator (Schrank, 1802).
militarius (Thunberg, 1822).
rufinus (Gravenhorst, 1820).
lineator (Fabricius, 1781).
  trilineatus (Gmelin, 1790).
scutellator (Gravenhorst, 1829).

AOPLUS Tischbein, 1874.
altercator (Wesmael, 1855).
defraudator (Wesmael, 1844).
castaneus (Gravenhorst, 1820).
ratzeburgii (Hartig, 1838).
virginalis (Wesmael, 1844).
ochropis (Gmelin, 1790).
rubricosus (Holmgren, 1864).
ruficeps (Gravenhorst, 1829).
humilis (Wesmael, 1857).

PLATYLABOPS Heinrich, 1950.
apricus (Gravenhorst, 1820).
  semirufus (Desvignes, 1856).
pulchellatus (Bridgman, 1889).

CRATICHNEUMON Thomson, 1893.
magus (Wesmael, 1855).
  nitidus (Bridgman, 1886).
varipes (Gravenhorst, 1829).
  fallax Habermehl, 1923.
jocularis (Wesmael, 1848).
  dissimilis auctt. angl.
  punctifrons (Holmgren, 1864).
rufifrons (Gravenhorst, 1829).
sicarius (Gravenhorst, 1829).
foersteri (Wesmael, 1848).
luteiventris (Gravenhorst, 1820).
versator (Thunberg, 1822).
nigritarius (Gravenhorst, 1820).
albifrons (Stephens, 1835).
  gravenhorstii (Boyer de Fonscolombe, 1847).
    nec (Wesmael, 1836).
    nec (Guérin-Méneville, 1838).
fabricator maculifrons (Stephens, 1835).
infidus (Wesmael, 1848).
  liostylus (Thomson, 1887).
culex (Mueller, 1776).
clarigator (Wesmael, 1844).
fugitivus (Gravenhorst, 1829).
corruscator (Linnaeus, 1758).
semirufus (Gravenhorst, 1820).
pseudocryptus (Wesmael, 1857).
albilarvatus (Gravenhorst, 1820).
lanius (Gravenhorst, 1829).

EUPALAMUS Wesmael, 1844.
wesmaeli Thomson, 1886.
lacteator (Gravenhorst, 1829).

ERISTICUS Wesmael, 1844.
clericus (Gravenhorst, 1829).

BARICHNEUMON Thomson, 1893.
anator (Fabricius, 1793).
gemellus (Gravenhorst, 1829).
  carri Habermehl, 1923.
albilineatus (Gravenhorst, 1820).
  albolineatus (Gravenhorst, 1829).
bimaculatus (Schrank, 1776).
saturatorius (Linnaeus, 1758).
monostagon (Gravenhorst, 1820).
maculicauda Perkins, 1953.
  perscrutator (Wesmael, 1844).
    nec (Thunberg, 1822).
dumeticola (Gravenhorst, 1829).
faunus (Gravenhorst, 1829).
albosignatus (Gravenhorst, 1829).
digrammus (Gravenhorst, 1820).
  nudicoxa (Thomson, 1888).
sanguinator (Rossi, 1794).
leucocheilus (Wesmael, 1844).
peregrinator (Linnaeus, 1758).
heracleanae (Bridgman, 1884).
praeceptor (Thunberg, 1822).
  bilunulatus auctt. angl.
derogator (Wesmael, 1844).
chionomus (Wesmael, 1844).
plagiarius (Wesmael, 1848).
deceptor (Scopoli, 1763).
  vestigator (Wesmael, 1844).
    nec (Thunberg, 1822).
lepidus (Gravenhorst, 1829).
tergenus (Gravenhorst, 1820).
callicerus (Gravenhorst, 1820).
coxiglyptus Heinrich, 1951.
  incubitor auctt. angl.
citator (Thunberg, 1822).
basiglyptus (Kriechbaumer, 1890).
locutor (Thunberg, 1822).
ridibundus (Gravenhorst, 1829).

CHASMIAS Ashmead, 1900.
motatorius (Fabricius, 1775).
paludator (Desvignes, 1854).
  paludicola (Wesmael, 1857).

***Ichneumonini*—cont.**

ICHNEUMON Linnaeus, 1758.
lugens Gravenhorst, 1829.
sarcitorius Linnaeus, 1758.
lautatorius Desvignes, 1856.
xanthorius Forster, 1771.
deliratorius Linnaeus, 1758.
molitorius Linnaeus, 1761.
crassifemur Thomson, 1886.
melanotis Holmgren, 1864.
  macrocerus Thomson, 1886.
confusor Gravenhorst, 1820.
  confusorius Gravenhorst, 1829.
bucculentus Wesmael, 1844.
septentrionalis atrifemur Perkins, 1953.
ligatorius Thunberg, 1822.
suspiciosus Wesmael, 1844.
extensorius Linnaeus, 1758.
  militaris auctt. angl.
gracilentus Wesmael, 1844.
albiger, Wesmael, 1844.
  tempestivus Holmgren, 1864.
validicornis Holmgren, 1864.
albicollis Wesmael, 1857.
stramentarius Gravenhorst, 1820.
terminatorius Gravenhorst, 1820.
computatorius Mueller, 1776.
eurycerus Thomson, 1890.
fuscatus Gravenhorst, 1829.
rufidorsatus Bridgman, 1887.
memorator Wesmael, 1844.
latrator Fabricius, 1781.
subquadratus Thomson, 1887.
analis Gravenhorst, 1829.
spurius Wesmael, 1848.
primatorius Forster, 1771.
bellipes Wesmael, 1844.
didymus Gravenhorst, 1829.
tuberculipes Wesmael, 1848.
megapodius Heinrich, 1949.
formosus Gravenhorst, 1829.
  obsessor Wesmael, 1844.
  haglundi Holmgren, 1864.
  microcephalus Stephens, 1835.
quartanus Perkins, 1953.
gracilicornis Gravenhorst, 1829.
emancipatus Wesmael, 1844.
exilicornis Wesmael, 1857.
caloscelis Wesmael, 1844.
insidiosus Wesmael, 1844.
minutorius Desvignes, 1856.
  captorius Thomson, 1887.
    nec Thunberg, 1822.
caproni Perkins, 1953.
nereni Thomson, 1887.
ignobilis Wesmael, 1855.
aquilonius Perkins, 1953.
vulneratorius Zetterstedt, 1838.
walkeri Wesmael, 1848.
haereticus (Wesmael, 1854).
cessator Mueller, 1776.

THYRATELES Perkins, 1953.
camelinus (Wesmael, 1844).

PROBOLUS Wesmael, 1844.
culpatorius (Linnaeus, 1758).
concinnus Wesmael, 1853.

CTENICHNEUMON Thomson, 1894.
edictorius (Linnaeus, 1758).
divisorius (Gravenhorst, 1820).
inspector (Wesmael, 1844).
rubroater (Ratzeburg, 1852).
  melanocastanus auctt. angl.
nitens (Christ, 1791).
devylderi (Holmgren, 1871).
  repentinus auctt. angl.
messorius (Gravenhorst, 1820).
funereus (Geoffroy, 1785).
panzeri (Wesmael, 1844).
  flavocinctus (Desvignes, 1856).
castigator (Fabricius, 1793).

SPILICHNEUMON Thomson, 1894.
occisorius (Fabricius, 1793).
johansoni (Holmgren, 1871).
stagnicola (Thomson, 1888).
celenae Perkins, 1953.
raptorius (Linnaeus, 1758).
septemguttatus (Gravenhorst, 1829).

AMBLYTELES Wesmael, 1844.
punctus (Gravenhorst, 1829).
    nec (Shaw, 1798).
fabricii (Schrank, 1802).
armatorius (Forster, 1771).
propinquus Perkins, 1953.
crispatorius (Linnaeus, 1758).
glaucatorius (Fabricius, 1793).
pictus (Schrank, 1776).
  ? *laboratorius* (Mueller, 1776).
  vadatorius (Illiger, 1807).
pallidicornis (Gravenhorst, 1829).
pulchellus (Christ, 1791).
  negatorius (Fabricius, 1793).
equitatorius (Panzer, 1786).
mercatorius (Fabricius, 1793).

Ichneumonini—cont.

monitorius (Panzer, 1801).
quadripunctorius (Mueller, 1776).
castanopyga (Stephens, 1835).
amatorius (Mueller, 1776).
luctatorius (Linnaeus, 1758).
longigena Thomson, 1888.
  cerinthius auctt. angl.
gradatorius (Thunberg, 1822).
trifasciatus (Gravenhorst, 1829).
palliatorius (Gravenhorst, 1829).
margineguttatus (Gravenhorst, 1829).
oratorius (Fabricius, 1793).
indocilis Wesmael, 1844.
subsericans (Gravenhorst, 1820).
elongatus Brischke, 1878.
  subsericans var. *elongatus* Brischke, 1878.

LIMERODES Wesmael, 1844.
arctiventris (Boie, 1841).

EXEPHANES Wesmael, 1844.
ischioxanthus (Gravenhorst, 1829).
  hilaris (Gravenhorst, 1829).
    nec (Say, Jan. 1829).
occupator (Gravenhorst, 1829).
caelebs Kreichbaumer, 1890.
amabilis Kreichbaumer, 1895.

ACOLOBUS Wesmael, 1844.
albimanus (Gravenhorst, 1829).
sericeus Wesmael, 1844.

HEPIOPELMUS Wesmael, 1844.
variegatorius (Panzer, 1800).
leucostigmus (Gravenhorst, 1820).

TRICHOLABUS Thomson, 1894.
strigatorius (Gravenhorst, 1829).

EURYLABINI

GOEDARTIA Boie, 1841.
alboguttata (Gravenhorst, 1829).

EURYLABUS Wesmael, 1844.
larvatus (Christ, 1791).
torvus Wesmael, 1844.
tristis (Gravenhorst, 1829).

ZIMMERINI

ZIMMERIA Heinrich, 1933.
dirus (Wesmael, 1853).

PLATYLABINI

RHYSSOLABUS Berthoumieu, 1896.
arcticus Hellén, 1942.

PRISTICEROS Gravenhorst, 1829.
serrarius Gravenhorst, 1829.
infractorius (Linnaeus, 1761).

PLATYLABUS Wesmael, 1844.
nigrocyaneus (Gravenhorst, 1829).
tenuicornis (Gravenhorst, 1829).
histrio Wesmael, 1855.
variegatus Wesmael, 1844.
dolorosus (Gravenhorst, 1829).
rufus Wesmael, 1844.
gigas Kreichbaumer, 1886.
transversus Bridgman, 1889.
punctifrons Thomson, 1888.
intermedius Holmgren, 1871.
opaculus Thomson, 1888.
pedatorius (Fabricius, 1793).
obator (Desvignes, 1856).
stolidus Perkins, 1953.
odiosus Perkins, 1953.
iridipennis (Gravenhorst, 1829).
pumilio Holmgren, 1871.
rufiventris Wesmael, 1844.
vibratorius (Thunberg, 1822).
decipiens Wesmael, 1848.
tricingulatus (Gravenhorst, 1820).
concinnus Thomson, 1888.

ASTHENOLABUS Heinrich, 1951.
  STENOLABUS Heinrich, 1936.
    nec Schulthess-Rechberg, 1910.
vitratorius (Gravenhorst, 1829).
latiscapus (Thomson, 1894).

CYCLOLABUS Heinrich, 1935.
nigricollis (Wesmael, 1844).
pactor (Wesmael, 1844).
dubiosus Perkins, 1953.

ECTOPIUS Wesmael, 1859.
rubellus (Gmelin, 1790).
exhortator (Fabricius, 1787).

HYPOMECUS Wesmael, 1844.
quadriannulatus (Gravenhorst, 1829).

APAELETICUS Wesmael, 1844.
inimicus (Gravenhorst, 1820).
bellicosus Wesmael, 1844.
  inclytus Wesmael, 1853.

PHAEOGENINI

RHEXIDERMUS Foerster, 1868.
  ISCHNOPSIDEA Viereck, 1914.
nigricollis (Wesmael, 1844).
  rufipes (Wesmael, 1848).
thoracicus (Gravenhorst, 1829).

HETERISCHNUS Wesmael, 1859.
pulex (Mueller, 1776).
  rufipes auctt.

MISETUS Wesmael, 1844.
oculatus Wesmael, 1844.

HEMICHNEUMON Wesmael, 1857.
elongatus (Ratzeburg, 1852).

TRACHYARUS Thomson, 1891.
corvinus Thomson, 1891.

NEMATOMICRUS Wesmael, 1844.
tenellus Wesmael, 1844.

STENODONTUS Berthoumieu, 1896.
marginellus (Gravenhorst, 1829).

ERIPLATYS Foerster, 1868.
  MELANOMICRUS Morley, 1903.
ardeicollis (Wesmael, 1844).
  elliotti (Morley, 1903).

HERPESTOMUS Wesmael, 1844.
wesmaeli Perkins, 1953.
nasutus Wesmael, 1844.
  furunculus Wesmael, 1844.
  intermedius Wesmael, 1844.
arridens (Gravenhorst, 1829).
  xanthops (Gravenhorst, 1829).
brunnicornis (Gravenhorst, 1829).

DICAELOTUS Wesmael, 1844.
(incl. DELOGLYPTUS Foerster, 1868).
pudibundus (Wesmael, 1844).
punctiventris (Thomson, 1891).
pictus (Schmiedeknecht, 1903).
parvulus (Gravenhorst, 1829).
orbitalis Thomson, 1891.
ruficoxatus (Gravenhorst, 1829).
fitchi Perkins, 1953.
erythrostomus Wesmael, 1844.
inflexus Thomson, 1891.
  ? *rufilimbatus* (Gravenhorst, 1820).
rufoniger Berthoumieu, 1896.
  pumilus var. *rufoniger* Berthoumieu, 1896.
cameroni Bridgman, 1881.
pumilus (Gravenhorst, 1829).
morosus Wesmael, 1855.
suspectus Perkins, 1953.

EPITOMUS Foerster, 1868.
parvus Thomson, 1891.
  pygmaeus (Brischke, 1890, *nec* 1888).
proximus Perkins, 1953.

ORONOTUS Wesmael, 1844.
binotatus (Gravenhorst, 1829).

NOTOSEMUS Foerster, 1868.
bohemani (Wesmael, 1855).
  albibuccus (Kreichbaumer, 1890).

MEVESIA Holmgren, 1889.
arguta (Wesmael, 1844).
guttata Perkins, 1953.

THYRAEELLA Holmgren, 1889.
collaris (Gravenhorst, 1829).
  similis (Bridgman, 1881).

DIADROMUS Wesmael, 1844.
quadriguttatus (Gravenhorst, 1829).
  rubellus (Gravenhorst, 1829).
    ex parte.
  nec (Gmelin, 1790).
troglodytes (Gravenhorst, 1829).
subtilicornis (Gravenhorst, 1829).
tenax Wesmael, 1844.
varicolor Wesmael, 1844.
albinotatus (Gravenhorst, 1829).
candidatus (Gravenhorst, 1829).
  guttulatus (Gravenhorst, 1829).

COLPOGNATHUS Wesmael, 1844.
celerator (Gravenhorst, 1807).
divisus Thomson, 1891.

CENTETERUS Wesmael, 1844.
confector (Gravenhorst, 1829).
opprimator (Gravenhorst, 1820).

EPARCES Foerster, 1868.
grandiceps Thomson, 1891.

MICROPE Thomson, 1891.
macilenta (Wesmael, 1844).

OIORHINUS Wesmael, 1844.
pallipalpis Wesmael, 1844.

Phaeogenini—cont.

PARAETHECERUS Perkins, 1953.
elongatus Perkins, 1953.

AETHECERUS Wesmael, 1844.
dispar Wesmael, 1844.
nitidus Wesmael, 1844.
placidus Wesmael, 1844.
discolor Wesmael, 1844.
longulus Wesmael, 1844.

OROTYLUS Holmgren, 1889.
mitis (Wesmael, 1848).

PHAEOGENES Wesmael, 1844.
(incl. PROSCUS Holmgren, 1889).
semivulpinus (Gravenhorst, 1829).
planifrons Wesmael, 1844.
heterogonus Holmgren, 1889.
curator (Thunberg, 1822).
  crassidens Thomson, 1891.
melanogonos (Gmelin, 1790).
  melanogonus (Gravenhorst, 1820), emend.
ophthalmicus Wesmael, 1844.
stipator Wesmael, 1855.
maculicornis (Stephens, 1835).
  scutellaris Wesmael, 1844.
invisor (Thunberg, 1822).
  homochlorus Wesmael, 1844.
mysticus Wesmael, 1855.
callopus Wesmael, 1844.
  tibiator (Thunberg, 1822).
    nec (Gravenhorst, 1820).
fulvitarsis Wesmael, 1844.
  ruficoxa Thomson, 1891.
rusticatus Wesmael, 1844.
  fulvitarsis auctt. angl. *ex parte*.
foveolatus Perkins, 1953.
cephalotes Wesmael, 1844.
elongatus Thomson, 1891.
coriaceus Perkins, 1953.
suspicax Wesmael, 1844.
flavidens Wesmael, 1844.
modestus Wesmael, 1844.
impiger Wesmael, 1844.
ischiomelinus (Gravenhorst, 1829).
eques Wesmael, 1844.
distinctus (Bridgman, 1887).
infimus Wesmael, 1844.
fuscicornis Wesmael, 1844.
trepidus Wesmael, 1844.
bellicornis Wesmael, 1844.
osculator (Thunberg, 1822).
  socius Holmgren, 1889.

ALOMYINI

ALOMYA Panzer, 1806.
semiflava Stephens, 1835.
debellator (Fabricius, 1775).

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Note.—Where the references to original descriptions are not quoted above, they may be found by consulting Dalla Torre (1902), Morley (1903), and Schmiedeknecht (1902) and (1928–1932).

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Pp. 177–219 ; 67 *Text-figures.*

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THE BULLETIN OF THE BRITISH MUSEUM (NATURAL HISTORY). *instituted in 1949, is issued in five series corresponding to the Departments of the Museum, and an Historical Series.*

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Issued December, 1953. *Price Ten Shillings.*

ON A VERY REMARKABLE FLEA FROM ARGENTINA COLLECTED BY DR. J. M. DE LA BARRERA

By H. E. KARL JORDAN
(Tring, Herts)

With 5 text-figures

The rapid increase of our knowledge of the Flea fauna of the Republic of Argentina during recent years is due to Dr. J. M. de la Barrera, Director of the Institute of Hygiene at Buenos Aires, and we students of Siphonaptera in the Tring Department of the British Museum (Natural History) are profoundly grateful to him for the invaluable collections submitted to the British Museum (Nat. Hist.) for study and report. The latest collection, received in the autumn of 1952, contained, *inter alia*, a number of interesting species from Bariloche, Nahuel Huapi, Rio Negro, where Dr. de la Barrera has a summer residence. Among these fleas is a species which excels in interest every other new one Dr. de la Barrera has previously discovered. When the specimens were cleared and mounted the very conspicuous and quite unexpected kind of distinction of this species took my breath away, and my two colleagues reacted in the same way: *incredible!* The Incredible Flea is the subject of this paper. A new species, new genus, new tribe. I name the genus *Barreropsylla* in appreciation of the great services Dr. de la Barrera has rendered and is continuing to render to the study of Fleas, an order of parasites so closely linked to his researches on the diseases of the wild mammals of his country. I expect that students of Siphonaptera will be as astonished at the somewhat spectacular distinctions of the species as we were, and that the extraordinarily wide gap, in some somatics, between *Barreropsylla excelsa* and the related species will arouse interest beyond the sphere of Siphonapterology. A short survey of the main characteristics will be sufficient to prove that the species provides an ample field of meditation for the taxonomist and geneticist In evaluating the characteristics of *B. excelsa* we must bear in mind that the species, apart from its special features, is an American Stephanocircid fitting well into the subfamily of *Craneopsyllinae*; there is no doubt about that. Confining the discussion, for the sake of brevity, to four of the obvious distinguishing features of *B. excelsa*, we can group them into two phylogenetically contrasting categories:

(*a*) Characters ancestral for the *Stephanocircidae* and (*b*) characters highly specialized. The first category is exemplified in the postantennal section of the head (usually termed occiput in our writings on fleas) (Fig. 3): the dorsal margin is medianly somewhat rounded dilated (*dt*); this is an early step in the evolution of a sclerotized band which extends some distance down the side in all other species of the family, *Cleopsylla* Rothschild, 1914, taking an intermediate position. Similarly primitive are the arrangement and number of the setae on the occiput : they form three rows, in which *Barreropsylla* agrees with many fleas outside the family, but differs from the known species of *Stephanocircidae*, there being four rows in *Cleopsylla* and five or six in the other genera (for *Cleopsylla* see F. Smit's paper on fleas in this issue of the *Bulletin*, Figs. 13, 14). Category (*b*) is represented by the modifications of the genal comb and the pronotum : whereas the known species of helmet fleas have a genal comb of four or more spines (sometimes much shortened), we find in *Barreropsylla* at the genal edge one to three dark knobs (*Gc*), which I interpret as being the remnants of a three-spined ancestral comb ; an advance in evolution by reduction which is no rarity in fleas. The modification of the pronotum is an extreme and probably not surpassed by any other flea existing ; it transcends the pronotal development of all fleas. The dorsal area is drawn out into a long process which reaches to the end of the mesonotum and bears a comb, the spines of which project downward. It is a feature which would seem to be more appropriate for a species of *Membracidae* than for a flea. In order to make it easier to understand what has happened to the pronotum of *Barreropsylla* we figure the pronotum of two other fleas (Figs. 1 and 2) for comparison. In contrast with the new genus the helmet fleas have a vertical pronotal comb more or less similar to that of *Nonnapsylla* Wagn. 1938 (Fig. 1) ; in no species of the family is there an indication of a development in the direction of the *Barreropsylla* pronotum. In other groups of fleas, however, species occur in which the pronotum is dorsally somewhat widened backwards, the comb being curved ; and a small number of species are now known in which the posterior margin is longer than the anterior one, the projecting posterior angle being raised well above the mesonotum (Fig. 2 ; see also figs. 54, 55 in F. Smit's paper). Comparing Fig. 3 with Fig. 1 it is evident that the development of

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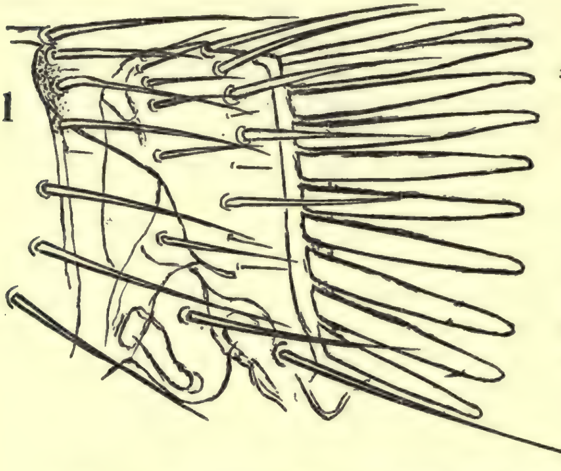

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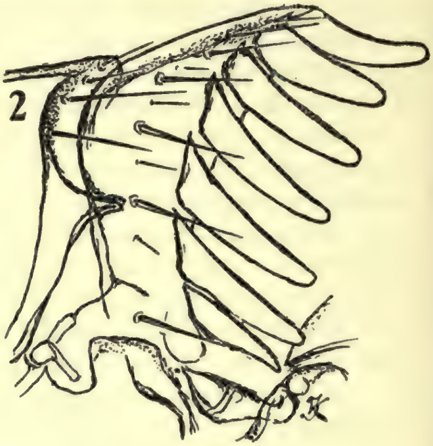

FIG. 1.—Pronotum of *Nonnapsylla rothschildi* Wagn., 1938, ♀ from Peru.

FIG. 2. Pronotum of *Meringis altipecten* Traub & Hoff, 1951, ♂ from New Mexico.

the mantilla has had various effects on the pronotum, one of them being a considerable reduction in its extension downwards. The true occiput, which lies partly within the pronotum, seems likewise to be affected ; the line which represents its upper surface in a lateral aspect is broader than usual, looking like a rod emanating from the subapical vertical sclerotized ridge ; its apex touches the inner side of the pronotal exoskeleton and is surrounded by a pale halo (*dap*), which give one the impression of being a condylus and socket—a very interesting point. However, the detail is too much obscured in both specimens and the observation requires confirmation by further material.

Though we see what has happened to the pronotum, we have no evidence of how and why the mantilla has come into existence. Nevertheless, the wide difference between the usual pronotum of a helmet flea (Fig. 1) and that of *Barreropsylla* (Fig. 3) and the occurrence here and there among other fleas of a pronotum like Fig. 2 suggest an evolution by stages. It is therefore reasonable to assume that intermediate stages have existed and perhaps one or the other of them still exists, which gives us hope that Dr. J. M. de la Barrera will discover the missing link or links. Meanwhile the new flea has to be described and its proper position in the *Craneopsyllinae* to be ascertained.

The distinctions of *Barreropsylla* being a mixture of primitive somatics, which put the genus at the bottom of the phylogenetic tree of the family, and very highly specialized ones, which place it at the top, it is obvious that the flea followed its own line of evolution and represents a tribe which branched off below the other branches.

Barreropsyilini tribus nova Craneopsyllinarum

Dorsal margin of occiput with a short downward widening in middle. Pronotum dorsally produced backwards into a process which bears a comb each side ; no vertical pronotal comb. This diagnosis is kept short as it may possibly have to cover in future one or several less strongly modified species.

Barreropsylla gen. nov.

(Fig. 3)

♂♀. Spines of comb of helmet long, except the first (uppermost), which is reduced in length and width, the ventral spine being the longest ; anterior area of helmet narrow, with short incrassations, many of which are obtuse, and with a row of small and rather indistinct bristles ; upper third of this area without incrassations ; ventrally the area projects down as a nose which is about as long as the base of the ventral spine is broad (in ♂ the nose broken away). Helmet not distinctly separated from genal area, but there is below the spines of the comb a pale stripe from the apex of the second spine downwards ; at the posterior side of this stripe there are numerous small bristles, and from its anterior side some narrow, apically rounded-dilated sclerotized streaks extend obliquely across it in an upward direction. Maxilla rounded-truncate, not pointed. Occiput with only three rows of bristles and a

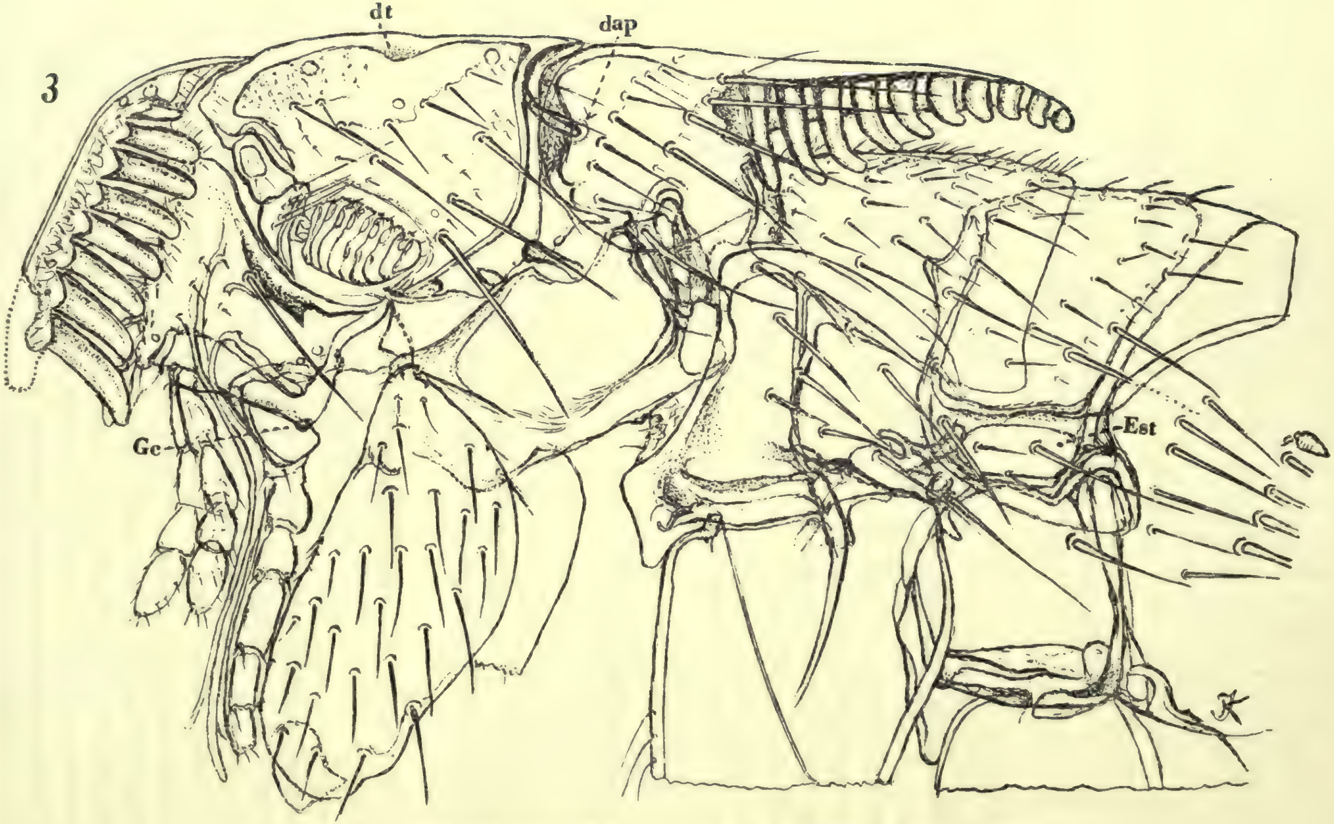
3
dt
dap
Gc
Est

FIG. 3. Head and thorax of *Barreropsylla excelsa* gen. & spec. nov., ♂.

single long bristle between second and third row. In the only known species the pronotal mantilla (or hood) on each side with a comb of ten spines, which gradually become shorter, the last one being little longer than broad.

Type : *Barreropsylla excelsa* sp. nov.

Barreropsylla excelsa sp. nov.

(Figs. 3, 4, 5)

♂♀. Comb of helmet with 8 spines (as in *Cleopsylla townsendi* Roths., 1914), lowest spine (measured from the upper basal angle) one-half longer than the second spine from above, basal margins of spines more or less deeply sinuate. Much behind pharynx and close to the sclerotized anterior margin of the antennal fossa one long bristle, in front of which appears a short branch of the tentorium ; no second long bristle between helmet and antennal fossa, but several small ones ; the small spoon-like sclerotizations under the spines of the helmet number 6 or 7. Remnants of genal comb (*Gc*) : on left side of head of ♂ a knob at lower angle of genal margin (Fig. 3), on right side a row of 3, in ♀ 3 on both sides. Segment I of antenna nearly straight, a little more than one-half longer than broad, II with a row of 5 or 6 bristles, of which in ♂ some (4?) reach beyond middle of club, whereas in ♀ 5 extend to apex of club or a little beyond it. The widening of the middle of the dorsal margin of the occiput is not distinctly more sclerotized than the rest of the margin. and there are no indications of other tubers ; the anterior row of occiput contains 2 bristles in ♂ and 3 in ♀, the second and third rows in ♂ and ♀ 5 each side, the second row being continued dorsally by one or two much smaller bristles. The labial palp has 5 segments and reaches to the trochanter (♂) or nearly (♀), being much longer than the maxillary palp. Pronotum with 2 rows of bristles, the posterior row containing 10 long ones on the two sides together. For bristles of meso- and metanotum see Fig. 3. Pale central area of metepisternum twice as long as broad ; on metepimere 2 rows of bristles, in ♂ containing 6, 5 on one side and 5, 4 on the other, in ♀ 6, 6 and 6, 4, besides a long bristle at apical margin in ♂ and ♀. Abdominal tergites likewise with 2 rows, the numbers of bristles being on III and IV in ♂ and ♀ 13 or 14, 17 or 18 (the two sides together), on V in ♂ 4, 17, in ♀ 4, 15, on VI in ♂ 4, 11, in ♀ 1, 12, on VII in ♂ 0, 10, in ♀ 5, 6. Antepygidial bristles long and stout, in ♂ 1 each side, in ♀ 2 equal in length. Basal abdominal sternum with a pair of ventral marginal bristles, sterna III to VI with a single row, numbering (the two sides together) in ♂ on III 10, IV 9, V 8, VI 7, in ♀ on III 11, IV to VI 8 each.

Femora, on outer surface, with a few lateral bristles in apical third and 1 to 3 further forward, besides the usual ventral bristles near base and apex; on inner surface only the ventral subapical one, no lateral ones ; on outer side of fore-, mid- and hind-tibiae a row of lateral bristles numbering respectively, in ♂ 6, 7, 9 or 10, and in ♀ 7, 10 or 11, and 12 ; the bristles at the dorsal margin and close to it counted from the base to the middle of the apical margin number the same in ♂ and ♀ ; in fore-tibia 19 and in mid- and hind-tibia 22 (± 1) ; the row of bristles at the apical margin is interrupted in all three tibiae, not forming a comb.

Terminalia. ♂. (Fig. 4). As VII.t. is totally and VIII.t. partially telescoped into VI.t., it is not possible to determine accurately the outline of each segment and to recognize the homology of every sclerite. In front of the antepygidial bristle lies a narrow curved sclerite which bears on the convex anterior side a row of rounded humps; it has evidently been shifted from its proper place; it may be a part of VII.t. or it may not. When a second ♂ becomes available for comparison the nature of this conspicuous sclerite may become clear. The margin of VIII.t. runs across the sensilium and in consequence the shape of the spiracle (*Spi*) is obscured. VIII.st. bears only three bristles each side, two of them small, the third fairly large; the extension dorsal of VIII.st. is not clear at all, and the dotted line to indicate this extension may be in the wrong place; IX.t. is much longer than broad; it is anteri-

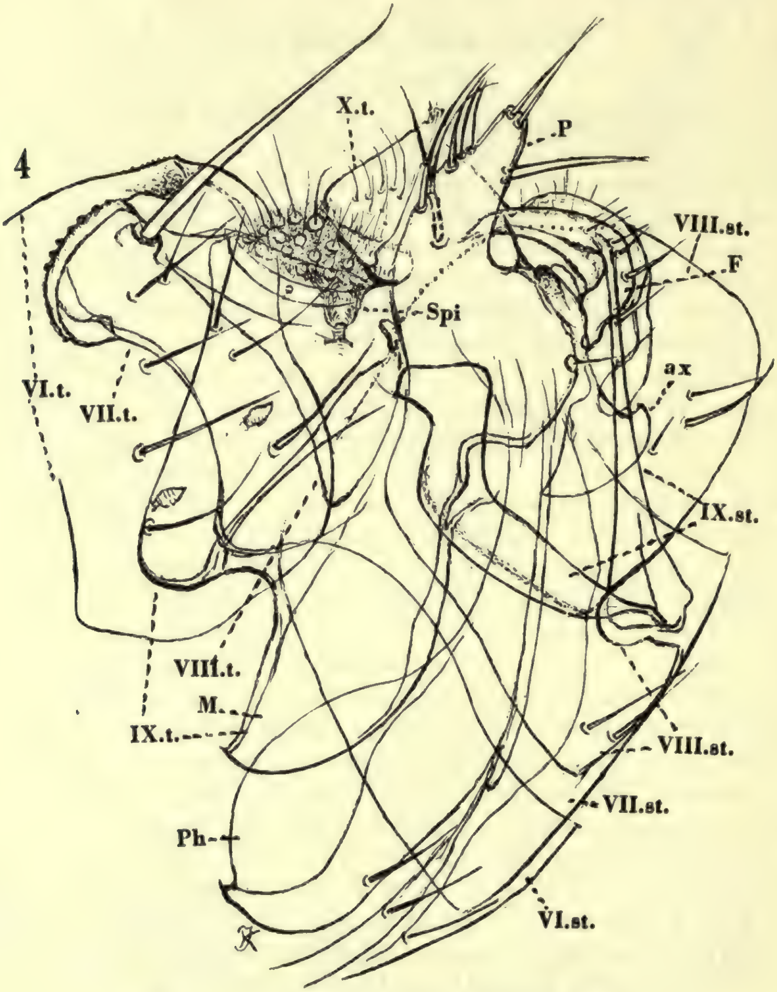

FIG. 4. *Barreropsylla excelsa*, terminalia of ♂.

orly produced into two broad apodemes ; the lower one is the manubrium (M), the upper margin of which (anterior margin in figure) is nearly straight and not much longer than the manubrium is broad at the base ; ventral margin evenly convex. The sinus above the manubrium round and the apodeme above it almost the inverse of it. The clasper (Cl) ends with a conical process (P), which is about twice as long as broad and bears a row of three stout and two slender bristles at the anterior (or dorsal) margin, two bristles at the apex and two at the posterior side, there being

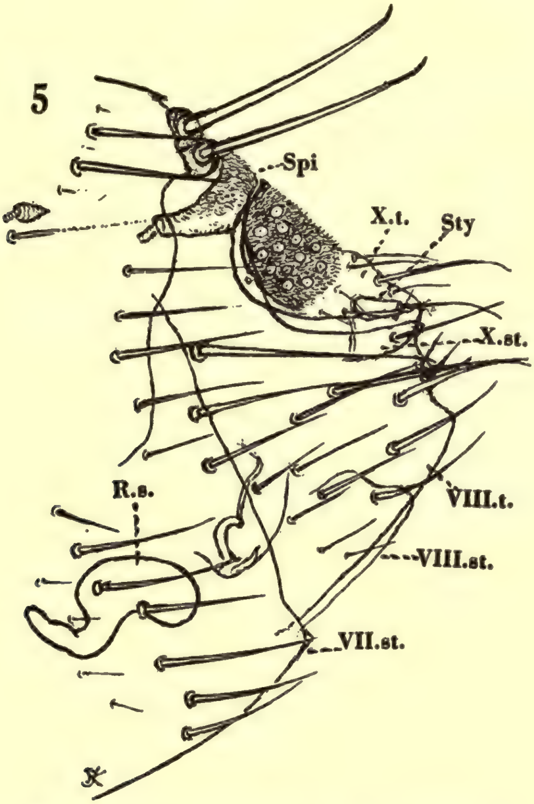

FIG. 5. *Barreropsylla excelsa*, terminalia of ♀.

in addition a long one on the inside at the base of the process. Below P and forming with it a round sinus there is a narrow, almost spine-like projection, which may possibly not belong to the clasper ; it is placed close to the clasper's sclerotized swelling, which bears the movable digitoid F. This is claw-like, narrow, curved towards P and pointed and bears a submarginal row of 4 bristles, of which the lowest is the stoutest ; then follow on the margin of F 6 very thin ones (some quite short) and at some distance from apex a long one about the thickness of the third of the submarginal row but longer. The upper end of the anterior arm of IX.st. is curved backwards as shown in Fig. 4 ; the posterior arm is straight, broadest at the base, gradually narrowed, the apical half being about as broad as the basal fourth of the antepygidial bristle and bearing two slender bristles. X.t. triangular in lateral aspect, with an oblique row of thin bristles on the side and several more bristles further forward, the base partially overlapped by the sensilium. Most of the distal sclerites of the phallosome (*Ph*) are hidden and not indicated in Fig. 4; the proximal portion is bulbiform and more convex dorsally than ventrally. Some distance proximally of the digitoid *F* lies, each side of body, a sclerite which resembles the blade of a woodcutter's axe (*ax*) and is conspicuous by its shape; it is evidently a part of the phallosome.

♀. (Fig. 5.) VII.t. with 13 bristles in a row and in front of them 8 small ones (on the two sides together); its apical margin nearly straight. Cavity of spiracle (*Spi*) of VIII.t. curved upwards, being a little more than twice as long as broad; from the spiracle downwards there are 19 bristles on the left side and 14 on the right, the upper bristle of the second row being the largest; on the inside of the apical margin there is a cluster of 3 short and stiff bristles and none further down. X.t. bears 7 bristles each side, the dorsal median one being larger than the apical bristle of the stylet (*Sty*); X.st. is evenly convex below, and has a small bristle at the upper margin and a long one near the lower part of the apical margin. Stylet about three times as long as broad. The spermatheca (*R.s.*) resembles that of *Tiarapsylla titschacki* Wagn., 1937, its orifice being ventral.

Length ♂ 2·2 mm., ♀ 2·5 mm.

One pair from the Republic of Argentina: collected by Dr. J. M. de la Barrera at Bariloche, Nahuel Huapi, Rio Negro, 780 mm., 3 vii. 1952, on *Akodon* sp., type ♂. In the coll. of the British Museum (Nat. Hist.).

DESCRIPTIONS OF NEW AND LITTLE-KNOWN SIPHONAPTERA

By F. G. A. M. SMIT

SYNOPSIS

SIX new fleas are described in this paper and two imperfectly known species are redescribed. Unless stated otherwise, all type specimens are in the Rothschild collection and the British Museum collection of Siphonaptera at Tring, Herts.

Family VERMIPSYLLIDAE

Dorcadia ioffi, n. sp.[1]

(Figs. 1, 3)

TYPE MATERIAL. Holotype male and allotype female: Issyk-Kul, Tien Shan, Turkestan, 1943, ex *Ovis aries*, received from I. G. Ioff. Paratypes: two females with same data as holotype and allotype.

DIAGNOSIS. Closely related to the hitherto only known representative of the genus, *Dorcadia dorcadia* (Rothschild), 1912, but readily distinguishable in both sexes by the much larger size of the abdominal spiracular fossae; the male differs in the shape and proportions of the modified segments, the female likewise in the terminal segments, though less markedly so.

DESCRIPTION. Apart from the larger size of the spiracular fossae and the details of the terminalia, there do not seem to be any major differences in the two species of *Dorcadia*.

MODIFIED ABDOMINAL SEGMENTS: MALE (Fig. 1, cf. Fig. 2). Manubrium rather narrow, about five times as long as broad at its apically broadest point, in *D. dorcadia* about two and a half times as long as broad. The posterior margin of the clasper above the movable process bears about half a dozen long setae at or near the margin which is truncate just above the movable process; in *D. dorcadia* only 2 of the marginal setae are elongated and the margin above the movable process forms an acute process. Along the margin of the clasper below the movable process 3 very long curved setae; in *D. dorcadia* there are 4–5 such setae. On the outer side of the clasper a vertical patch of about 6 setae, on the corresponding part, but on the inside, about 16 small setae; in *D. dorcadia* on the outer side about 12 setae, but none on its inner side. Movable process proportionally longer than that of

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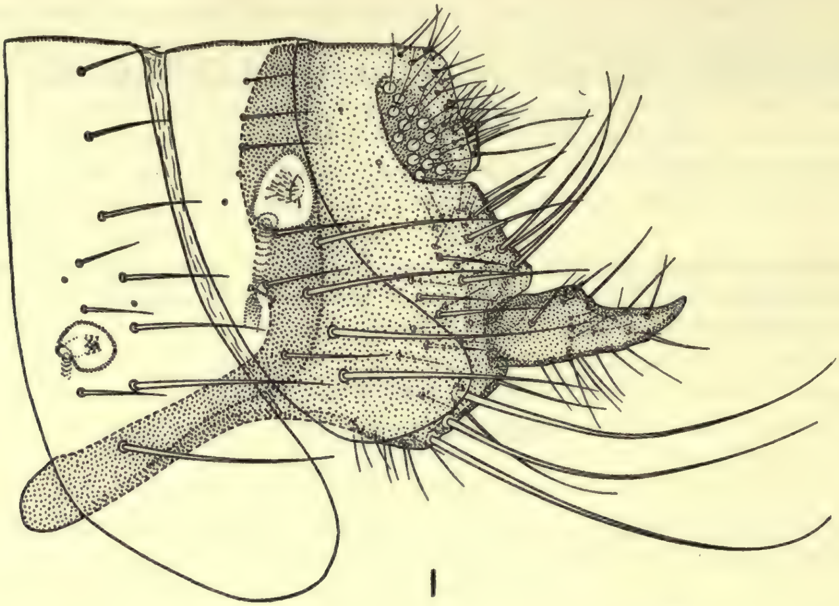
[1] The specimens of this new species (*Dorcadia*) and the next one described here (*Chaetopsylla*) were among material received in 1946 from Prof. I. G. Ioff of the Parasitological Laboratory at Saratov, U.S.S.R., in exchange for material from the Tring collection. Since then it has become practically impossible to communicate with colleagues in Russia, and I have not been able to inform Professor Ioff of the status of the specimens which are now here described as new. To describe new species without the consent of the colleague who submitted the material for study and comments would normally be unethical, but in this case the increase of our knowledge seemed to outweigh this consideration—a view which is shared by my colleagues at Tring.



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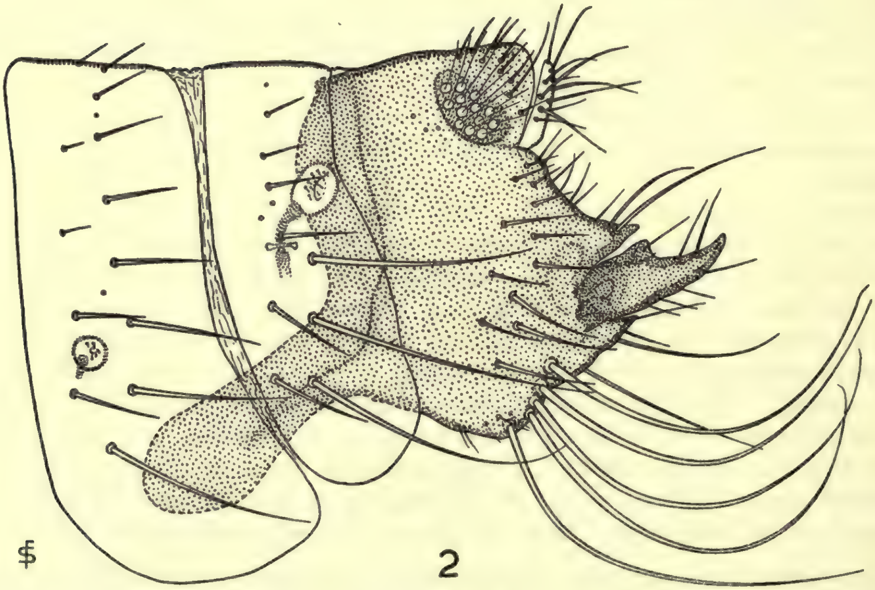

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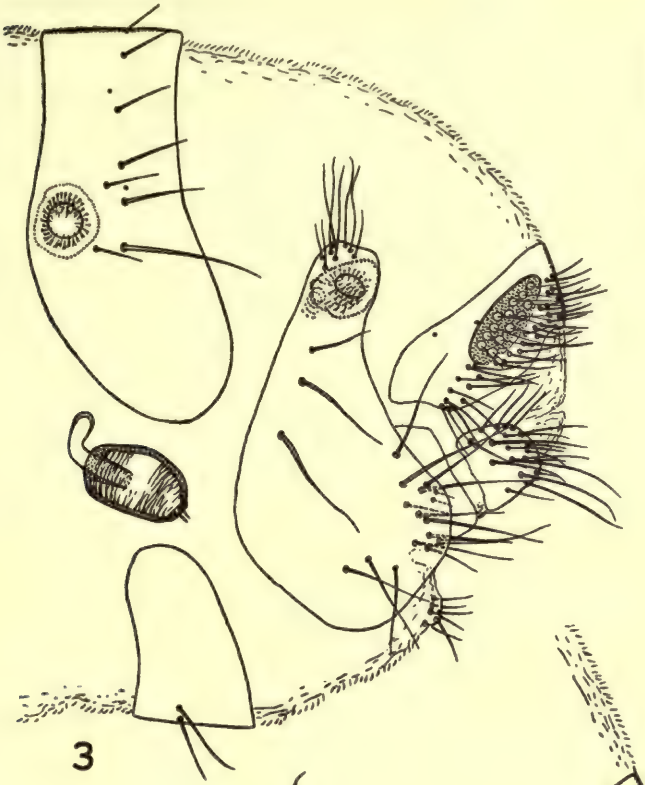
Figs. 1, 2.

Fig. 1, *Dorcadia ioffi* n. sp. Terga VII, VIII and clasper (tergum IX) and anal segment. (Holotype.) Fig. 2, *Dorcadia dorcadia* (Rothschild). Terga VII, VIII and clasper (tergum IX) and anal segment. (Yen-an Fu, Shensi.)



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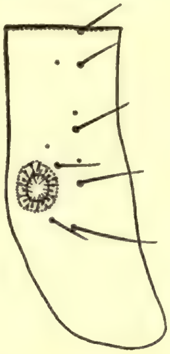

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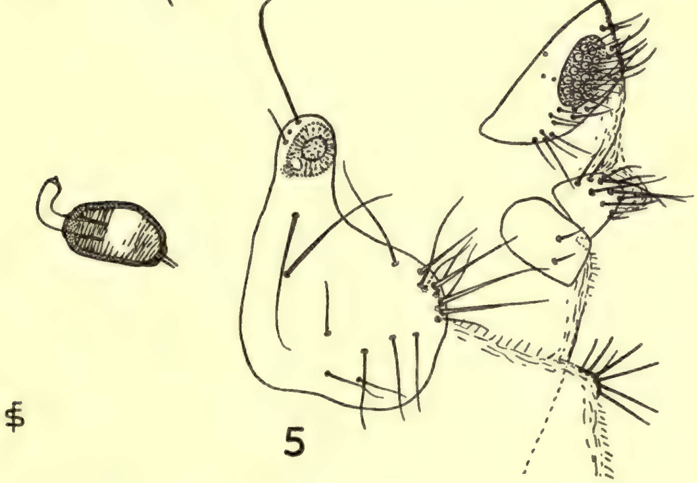

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FIGS. 3–5.

Fig. 3, *Dorcadia ioffi* n. sp. Terminalia of female. (Allotype.) Fig. 4, *Dorcadia dorcadia* (Rothschild). Tergum VII. (Yen-an Fu, Shensi.) Fig. 5, *Dorcadia dorcadia* (Rothschild). Terminalia of female. (Yen-an Fu, Shensi).

the other species and with more numerous setae. In both species the dorsal anal lobe (tergum X) is fused with tergum IX ; the ventral anal lobe (sternum X) is distinctly longer in the new species than in *D. dorcadia.* The very peculiar phallosome is extremely similar in the two species.

FEMALE (Fig. 3, cf. Figs. 4, 5). This is a larger flea than *D. dorcadia* (although the reverse appears true owing to the lesser degree of expansion of the available females of *D. ioffi*), and the fact that its tergal and sternal sclerites are larger (cf. Figs. 3 and 4, 5) may be due to this fact, but they are also distinctly broader and with a more convex anterior margin, as shown in the figures. The spiracular fossae are actually and relatively larger ; above the spiracular fossa of tergum VIII about 8 upwards-pointing setae, while in *D. dorcadia* there are only 2 or 3 such setae ; the setae behind and below the sensilium and on the ventral anal lobe are also more numerous than in *D. dorcadia.* The spermathecae of the two species are very similar.

LENGTH OF MALE, 3 mm. ; the length of the female cannot be given in a satisfactory way, owing to the different stages of expansion of the specimens.

REMARK. This new species is named in honour of the great Russian Siphonapterologist, Prof. I. G. Ioff.

Chaetopsylla caucasica, n. sp.

(Figs. 6, 8, 10, 12)

TYPE MATERIAL. Holotype male and allotype female : Kisha, N.W. Caucasus, 1940, ex *Martes martes*, received from Prof. I. G. Ioff.

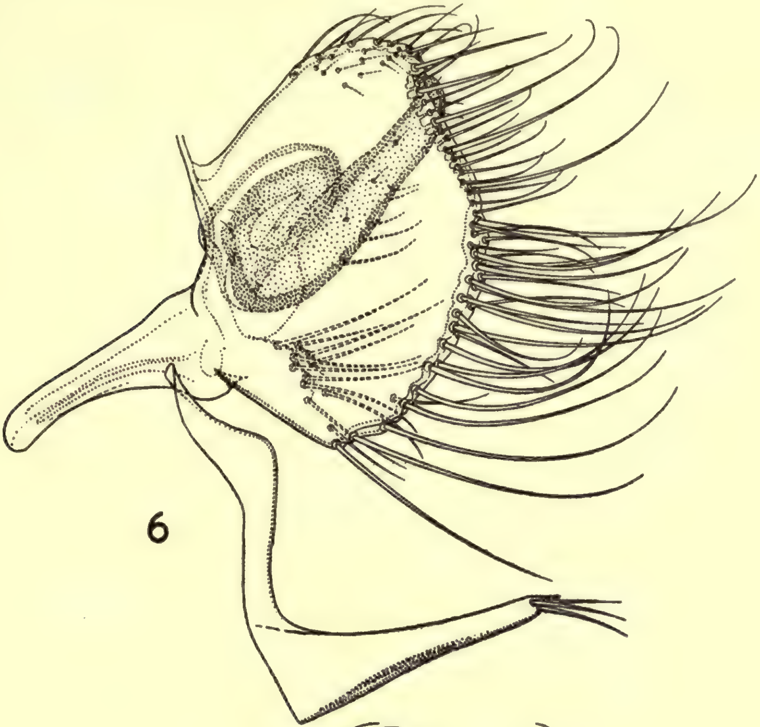
DIAGNOSIS. The new species is closely related to *Chaetopsylla matina* Jordan, and differs from it in the male by the shape of the corpus of the clasper, the straightness of the movable process and the greater length of the distal arm of sternum IX ; the female is difficult to distinguish from that of *C. matina*, except for a difference in the shape of the spermatheca.

DESCRIPTION : HEAD. Frontal tubercle deciduous ; labial palp consisting of 5 segments, not extending beyond the apex of the fore coxa. Without a strong seta on the genal process immediately below the hinder part of the eye.

THORAX. Metepimeron with 2 rows of setae, the anterior row being well developed and composed of 4 or 5 setae.

ABDOMEN. The setae of the terga are not notably long and coarse ; for the arrangement of setae below or behind the spiracular fossae of terga II–VII see Fig. 12 ; in the female these spiracular fossae are situated well in front of the short main tergal row of setae and there are in this sex two setae above the spiracular fossa of tergum II, and one above those of terga III–VII.

MODIFIED ABDOMINAL SEGMENTS : MALE (Figs. 6, 8, cf. Figs. 7, 9). Corpus of clasper about one and a half times as long as broad, as in *C. matina*, but its posterior margin is strongly convex ; the setae along this margin far more numerous than in *C. matina* ; setae on the lower part of the inner side of the corpus longer and more distinctly grouped together than in *C. matina.* Movable process apparently straight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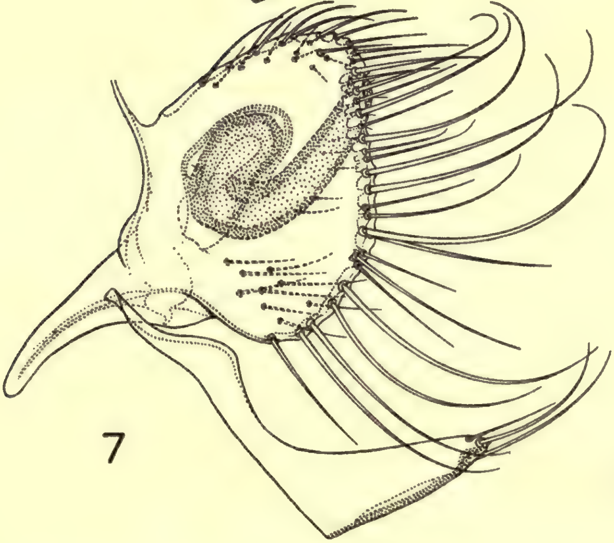
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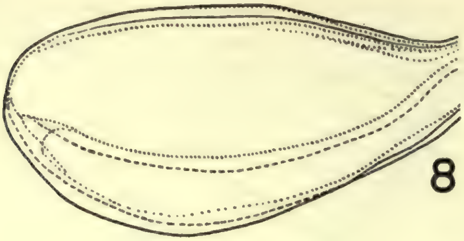
Figs. 6, 7.

Fig. 6, *Chaetopsylla caucasica* n. sp. Clasper and sternum IX. (Holotype.) Fig. 7, *Chaetopsylla matina* Jordan. Clasper and sternum IX. (Cauterets, Hautes Pyrenées.)



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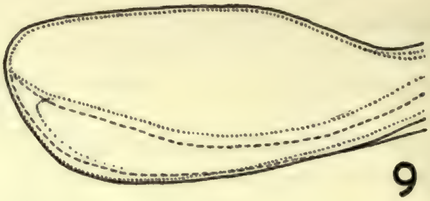

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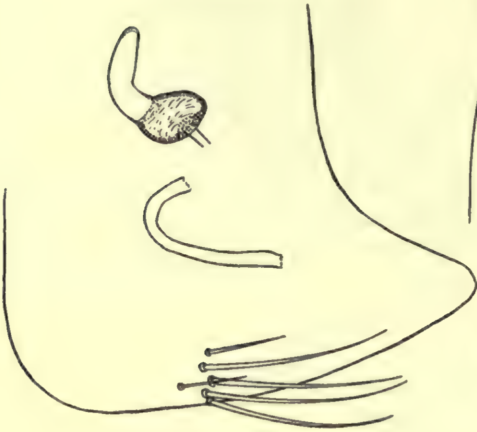

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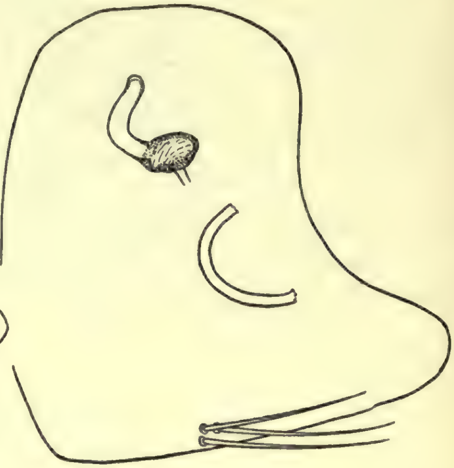

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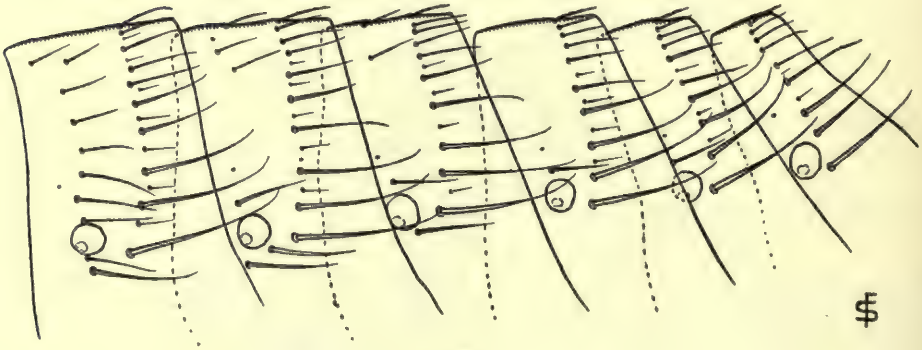

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Figs. 8–12.

Fig. 8, *Chaetopsylla caucasica* n. sp. Aedeagal apodeme. (Holotype.) Fig. 9, *Chaetopsylla matina* Jordan. Aedeagal apodeme. (Cauterets, Hautes Pyrenées.) Fig. 10, *Chaetopsylla caucasica* n. sp. Sternum VII, spermatheca and sclerotized part of the ductus bursae copulatricis. (Allotype.) Fig. 11, *Chaetopsylla matina* Jordan. Sternum VII, spermatheca and sclerotized part of the ductus bursae copulatricis. (Cauterets, Hautes Pyrenées.) Fig. 12, *Chaetopsylla caucasica* n. sp. Terga II–VII of male. (Holotype.)

(that of the right-hand side is curved in the only male available, but this shape seems to be due to distortion) ; the process narrows markedly at two-thirds and is then of uniform width to near the apex, where it tapers gradually ; the acetabulum is situated at the anterior margin of the corpus, while in *C. matina* it is placed well away from this margin. Manubrium with a straight upper and a convex lower margin. Proximal arm of sternum IX more distinctly angulate than that of *C. matina*, while the distal arm is slenderer and relatively much longer than in the latter species and bears apically a few rather short setae (not long ones as in *C. matina*). Aedeagal apodeme much broader than that of *C. matina*.

FEMALE (Fig. 10, cf. Fig. 11). Sternum VII very much like that of *C. matina*, but the ventral lobe appears to be sharper, although females of *C. matina* are rather variable in this respect. Tergum VIII with a main row of 11 setae on one side, 12 on the other, on each side the 6 lower and larger setae of this row are situated below the spiracular fossa. Appendix of spermatheca relatively stouter than that of *C. matina*, while the reservoir also appears to be much larger in relation to the length of the appendix. The sclerotized part of the ductus bursae copulatricis is less strongly bent than that of *C. matina*, but whether this shape is genuine or not cannot be ascertained from the only female available.

LENGTH OF MALE, 2½ mm. ; female approximately 3½ mm.

Family STEPHANOCIRCIDAE

Subfamily CRANEOPSYLLINAE

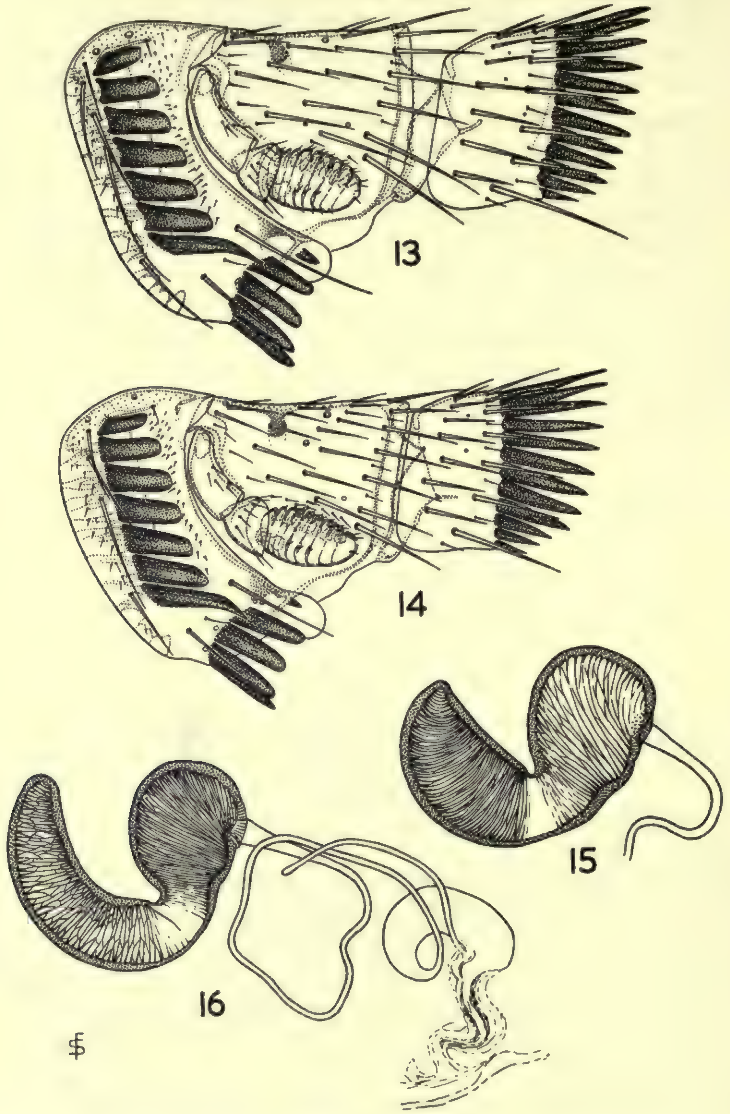
Cleopsylla monticola, n. sp.

(Figs. 13, 15, 17, 19, 21)

TYPE MATERIAL. Holotype male and allotype female : Pichincha, Ecuador, 1st October, 1931, ex *Caenolestes fuliginosus*, collected by F. Spillmann. Paratypes : one male and one female, Chimborazo, Ecuador, April, 1931, ex *Sigmodon* sp. ; one male, Iliniza, Ecuador, April, 1931, ex *Thomasomys* sp. ; these paratypes were also collected by F. Spillmann.

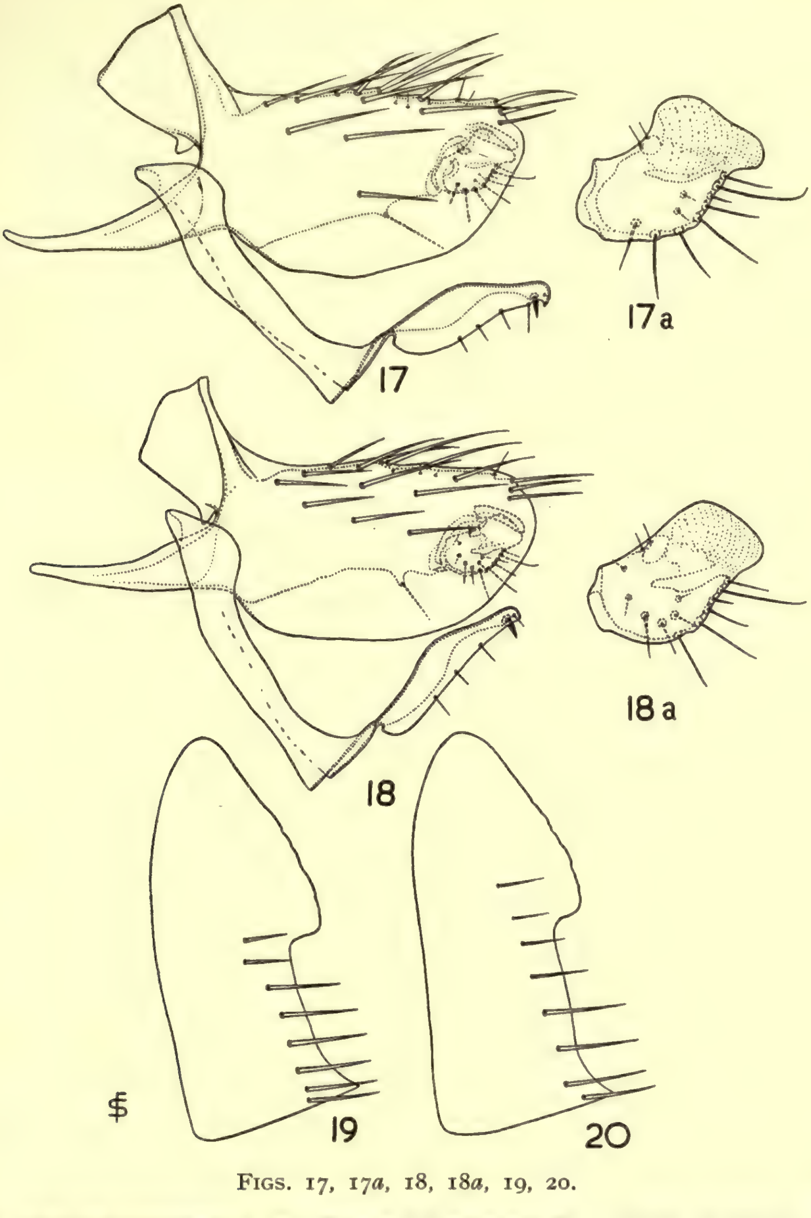
DIAGNOSIS. This new species from Ecuador differs from the hitherto only known representative of the genus, *Cleopsylla townsendi* Rothschild (occurring in Peru), by the straightness of the anterior margin of the frons, the strongly reduced number of small setae bordering the antennal fossa dorsally, and by the chaetotaxy of the hind tibia. The modified abdominal segments and genitalia of the male are extremely similar in the two species, but the females are most easily distinguishable by the shape of the spermatheca.

DESCRIPTION : HEAD (Fig. 13, cf. Fig. 14). Dorsal margin of frons anteriorly strongly rounded ; the anterior margin of the frons slopes strongly backwards ; it is straight for most of its extent and in its lower portion rounded to form the genal margin, which is slightly longer than that of *C. townsendi*. On the frons there is a vertical ctenidium, consisting of 7 spines in the male, and 8 in the female, as is also the case in the other species ; the two species also agree in having the lowest spine elongated and curved downwards pre-apically; the bases of these spines in *C. monticola* form an imaginary line which is parallel to the straight frontal margin, while this is not the case in *C. townsendi* owing to this species having usually a markedly convex anterior frontal margin. In front of the ctenidium a row of 5



FIGS. 13–16.

Fig. 13, *Cleopsylla monticola* n. sp. Head and pronotum of male. (Iliniza, Ecuador.) Fig. 14, *Cleopsylla townsendi* Rothschild. Head and pronotum of male. (Carhuamayo, Peru.) Fig. 15, *Cleopsylla monticola* n. sp. Spermatheca (Allotype.) Fig. 16, *Cleopsylla townsendi* Rothschild. Spermatheca and genital ducts. (Tacna, Peru.)



FIGS. 17, 17*a*, 18, 18*a*, 19, 20.

Fig. 17, *Cleopsylla monticola* n. sp. Clasper and sternum IX. (Iliniza, Ecuador.) Fig. 17*a*, *Cleopsylla monticola* n. sp. Movable process of clasper. (Iliniza, Ecuador.) Fig. 18, *Cleopsylla townsendi* Rothschild. Clasper and sternum IX. (Carhuamayo, Peru.) Fig. 18*a*, *Cleopsylla townsendi* Rothschild. Movable process of clasper. (Carhuamayo, Peru.) Fig. 19, *Cleopsylla monticola* n. sp. Sternum VII of female. (Allotype.) Fig. 20, *Cleopsylla townsendi* Rothschild. Sternum VII of female. (Tacna, Peru.)

setae, the fourth seta from above being the longest. The genal ctenidium consists of 5 spines, the lowest of which is a little longer than the others and partly concealed by its neighbour, while the small most dorsal spine is placed on the broad, rounded genal process and is rather variable in size. Clava of antenna somewhat broader than that of *C. townsendi* ; antennal fossa dorsally bordered by one or two small setae, in contrast with *C. townsendi*, where there are many more such setae. Chaetotaxy of the postantennal region of the head virtually the same in the two species, except that in the new species the setae, like most of the other setae, are slightly longer than in *C. townsendi*.

THORAX. Pronotum (Fig. 13, cf. Fig. 14) with two rows of setae and a ctenidium of 25–28 spines in the male and 25–27 in the female (in *C. townsendi*, male with 22–25, female with 21–26 spines) ; the sharply pointed straight pronotal spines gradually decrease in length from above downwards in both species. Pronotum dorsally longer than the uppermost spines, while the reverse is true for *C. townsendi* ; mesothorax and metathorax as in the latter species.

LEGS (Fig. 21, cf. Fig. 22). A row of short spiniform setae on the inner side of the hind coxa. The chaetotaxy of the posterior margin of the tibiae of the two species is different and the differences described and figured here are taken from the hind tibia: the two median groups of strong setae arising from notches in the posterior margin consist of 3 setae in both species, but in the new species the innermost seta is displaced downwards and has become marginal, thus causing the tibia to possess a false comb, while in *C. townsendi* the innermost seta of the two groups is in line with the other two setae and therefore the more primitive condition is retained here.

ABDOMEN. Terga I–V in the male with 2–4, 2–4, 3, 3, 2–3 apical spinelets respectively on each side, in the female 2–3, 3, 1–2, 1–3, 1–2 respectively ; for *C. townsendi* these figures are : in the male 2–3, 2–3, 1–2, 1–2, 1, and in the female 2–3, 2–3, 1–2, 1–2, 1. The chaetotaxy of the first 7 abdominal segments is virtually the same in the two species.

MODIFIED ABDOMINAL SEGMENTS : MALE (Fig. 17, cf. Fig. 18). Movable process of clasper (Fig. 17*a*) with its apex expanded both anteriorly and posteriorly, the posterior expansion forming a conspicuous lobe which is almost absent in *C. townsendi* (Fig. 18*a*). The distal arm of sternum IX tends to be slightly broader than that of *C. townsendi*. In other respects the modified segments, as also the phallosome, are very much alike in the two species.

FEMALE (Figs. 15, 19, cf. Figs. 16, 20). Posterior margin of sternum VII with a long and shallow sinus, similar to that in *C. townsendi* though shorter ; the row of setae extends upwards to a point level with the lower margin of the lobe of the posterior margin of the sternum, while in *C. townsendi* it extends to above this point. Spermatheca markedly different from that of the Peruvian species, its tail being much shorter and stouter and internally finely striated (instead of reticulate) and the striae on the inside of the reservoir are less dense. The genital ducts could not be made out in the two females available.

LENGTH of male, 2 mm. ; female, 2½ mm.

REMARKS. *Cleopsylla townsendi* is known to occur in places at high altitudes in Peru (between 12,000 and 16,000 ft.) and the same seems to be true for the new species described above, for all specimens of the latter were collected on three of the highest mountains in Ecuador, namely Chimborazo (altitude ± 20,500 ft.), Pichincha (altitude ± 16,000 ft.) and Iliniza (altitude ± 17,500 ft.). Though the altitude is not given on the slide labels, it seems safe to assume that the specimens were collected well above 10,000 ft., near the timber line.

It should be noted that the paratypes of *Cleopsylla monticola* were recorded by Jordan (1931) under the name of *Cleopsylla townsendi*, and also that (contrary to his belief at that time) the supposed inaccuracy in his drawing of the tail of the spermatheca of *C. townsendi* does not exist, the drawing being perfectly accurate and the difference in the spermatheca being specific.

Plocopsylla phyllisae, n. sp.

(Figs. 25, 26, 28, 30)

TYPE MATERIAL. Holotype male from Guamani, Ecuador, July, 1931, ex *Oryzomys* sp., collected by F. Spillmann.

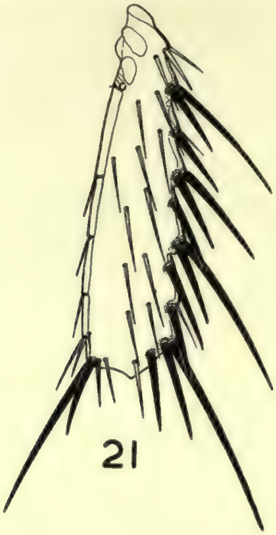
DIAGNOSIS. The new species is related to *Plocopsylla phobos* Jordan, but differs in the male by the spines of the genal ctenidium being much more strongly reduced, by the typical abdominal terga not being rounded off dorso-posteriorly, and by having a broader clasper and a differently shaped movable process and spiniform on the inner side of the latter; moreover, the sterna IX of the two species are not alike and the hind tibiae differ in their chaetotaxy. Female unknown.

DESCRIPTION: HEAD (Fig. 25, cf. Figs. 23, 24). Prectenidial part of head narrower than the " helmet "- ctenidium, which consists of 14 spines on each side. In other respects the head is extremely like that of *P. phobos*, except that the four genal spines are strongly reduced in size, which is not the case in the male of any other known *Plocopsylla*, and in the female sex such small genal spines are only found in *P. phobos* (which could imply that the females, attributed to *P. phobos*, are not that species).

THORAX. Very similar to that of *P. phobos*; in both species the pronotal ctenidium consists of 14 spines.

LEGS (Fig. 30, cf. Fig. 31). The setae at the posterior (dorsal) margin of the hind tibia are much thinner and therefore grouped more closely together than in *P. phobos*, while the fourth notch from the apex bears only 2 setae as against 3 in *P. phobos*.

ABDOMEN (Fig. 26, cf. Fig. 27). Chaetotaxy of terga I–VII and of sterna II–VII similar to that of *P. phobos*, but the setae are much shorter than in the latter species. The shape of the terga is quite normal (Fig. 26), but stress should here be laid upon the shape of those of *P. phobos*: in the male of that species the dorsal part of the posterior margin of terga II–VI is rounded and forms no distinct angle with the dorsal margin (Fig. 27). This is an interesting form of sexual dimorphism, since in the female of *P. phobos* the terga are normally shaped (as in Fig. 26). Similar modified terga are found in the males of *P. wolffsohni* (Rothschild) and *P. chiris*



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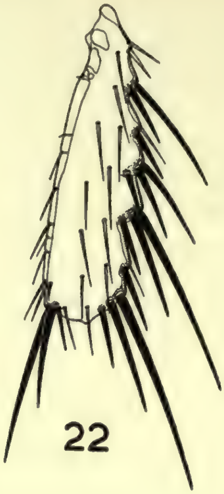

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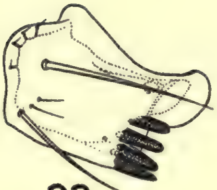

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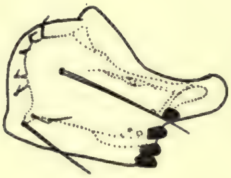

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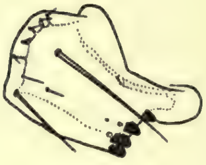

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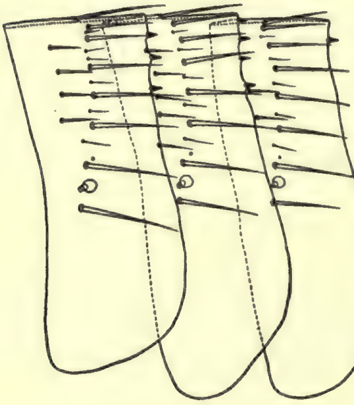

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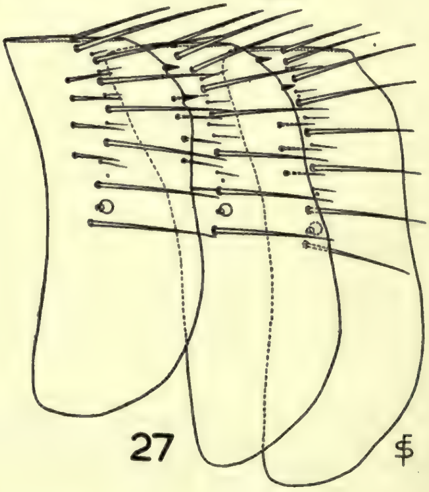

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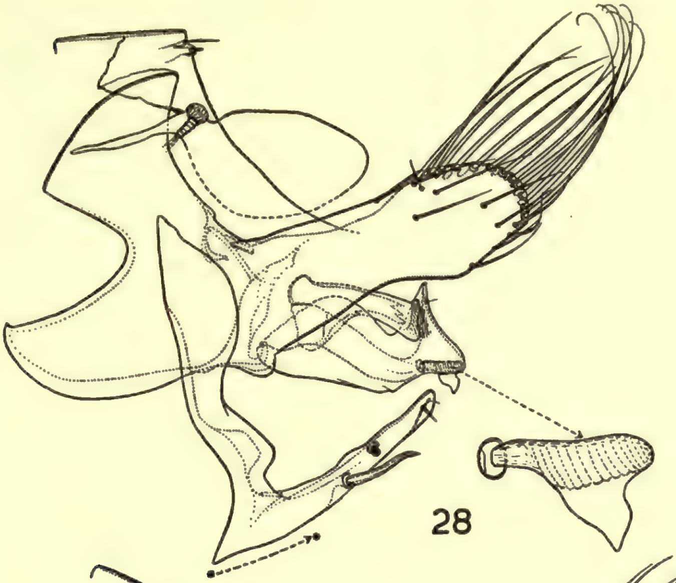
Figs. 21–27.

Fig. 21, *Cleopsylla monticola* n. sp. Hind tibia of male. (Iliniza, Ecuador.) Fig. 22, *Cleopsylla townsendi* Rothschild. Hind tibia of male. (Carhuamayo, Peru.) Fig. 23, *Plocopsylla phobos* Jordan. Gena of male. (Holotype.) Fig. 24, *Plocopsylla phobos* Jordan. Gena of female. (Guamani, Ecuador.) Fig. 25, *Plocopsylla phyllisae* n. sp. Gena of male. (Holotype.) Fig. 26, *Plocopsylla phyllisae* n. sp. Terga III–V. (Holotype.) Fig. 27, *Plocopsylla phobos* Jordan. Terga III–V. (Holotype.)



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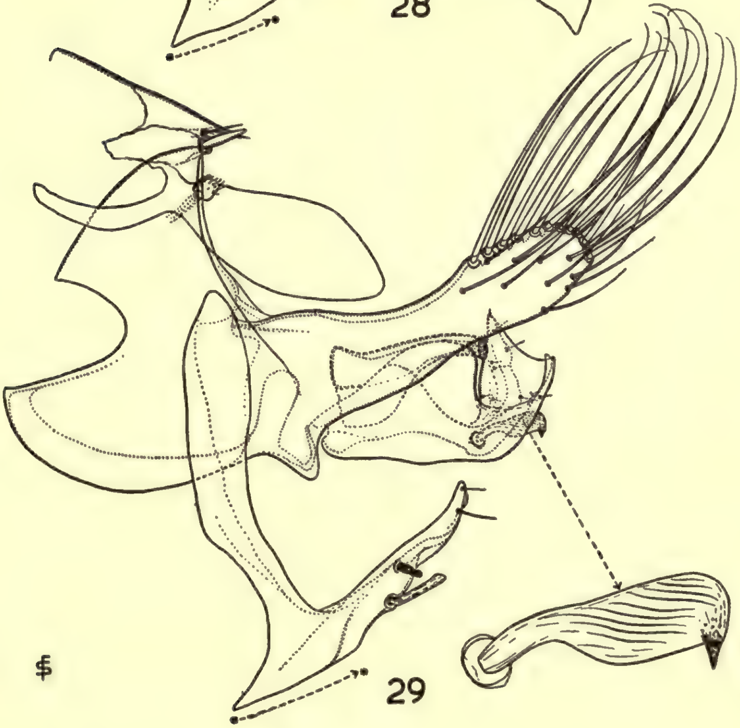

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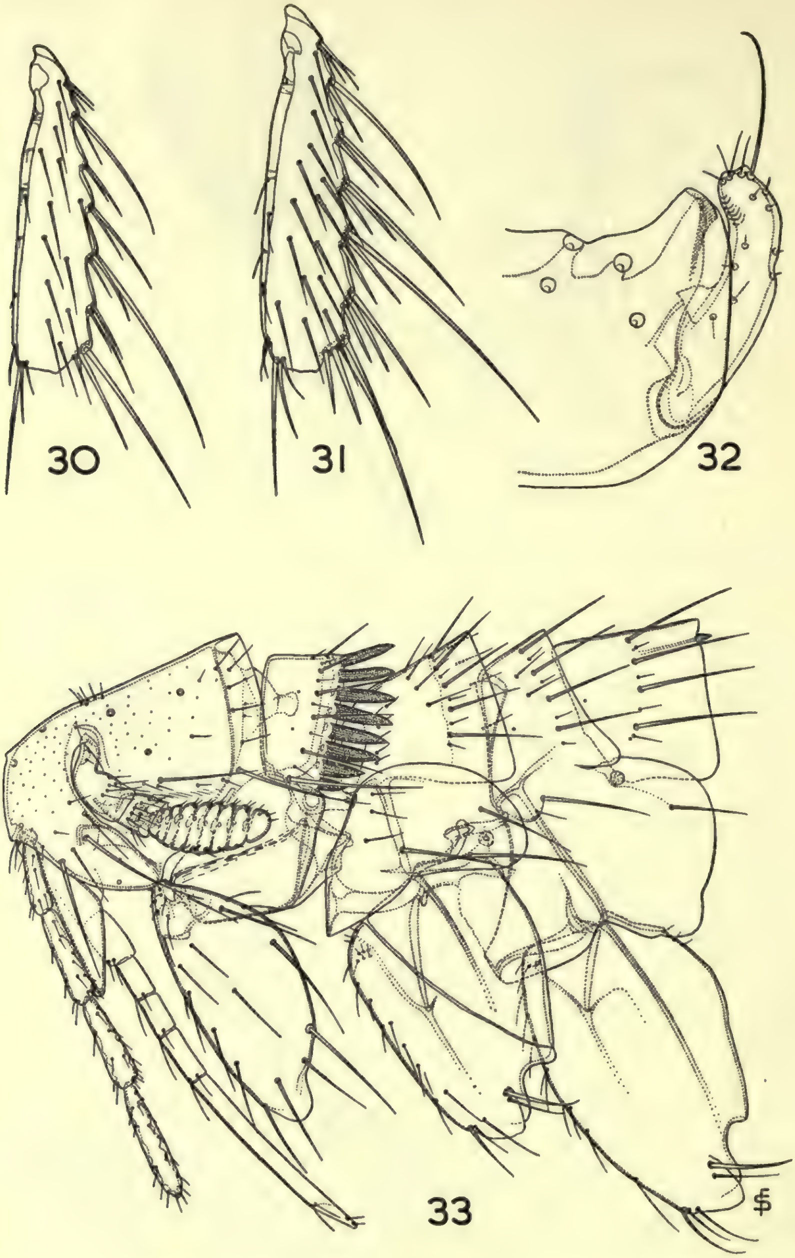
FIGS. 28, 29.

Fig. 28, *Plocopsylla phyllisae* n. sp. Modified abdominal segments. (Holotype.) Fig. 29, *Plocopsylla phobos* Jordan. Modified abdominal segments. (Holotype.)



FIGS. 30–33.

Fig. 30, *Plocopsylla phyllisae* n. sp. Hind tibia of male. (Holotype.) Fig. 31, *Plocopsylla phobos* Jordan. Hind tibia of male. (Holotype.) Fig. 32, *Craneopsylla minerva minerva* (Rothschild). Apex of clasper. (Villa Carolina, Rio Lavallen, Argentina.) Fig. 33, *Megarthroglossus jamesoni* n. sp. Head, thorax and coxae. (Holotype.)

(Jordan), and the former is also sexually dimorphic in this respect, like *P. phobos*, while the sole known female of *P. chiris* lacks the abdomen. Terga I–V with 4–5, 3–4, 3–4, 3–4, 1–1 apical spinelets respectively (in *P. phobos*: 3–4, 3–4, 2–3, 1–2, 0 respectively). Of the two antesensilial setae the upper one is a thin and very small seta, and the lower, which in the other species of *Plocopsylla* (except *P. enderleini* Wagner, where antesensilial setae are absent in the male) is quite normally developed, though sometimes rather short, is vestigial.

Modified abdominal segments of male (Fig. 28, cf. Fig. 29). Apodeme of tergum IX and manubrium less broad than in *P. phobos*, but the corpus of the clasper is distinctly broader than in the latter, its dorsal margin being almost straight; the dorso-apical margin is bordered by a fringe of 12 long setae. Movable process of clasper far less broad basally than that of *P. phobos*, and with a sharply pointed apex; the modified spiniform seta on the inner side of the movable process differs markedly from those in all other representatives of the genus by having a downward-pointing triangular thin extension. As is usual in all members of this genus and also in those of the other genera of the subfamily Craneopsyllinae, a distinct non-setiferous process is attached to the inside of the corpus of the clasper near the dorsal part of the base of the movable process. This lateral process is always associated with the latter, and a useful hint as to its origin and function is given by the structure of the clasper of *Craneopsylla minerva minerva* (Rothschild) (Fig. 32). Here we see that on the inner side of the clasper, along the margin of the dorso-apical angle, the surface is partly sclerotized and striated; opposite this the movable process has a striated patch on its outer side. In *Plocopsylla* the clasper is extended further backwards and the apex of the movable process does not reach the apex of the clasper; since the inner striated sclerotization is so closely associated with the movable process, it has moved inwards and developed into a rodlike structure. The function of this process could be (*a*) to act as a locking device for the movable process or (*b*) to serve as a stridulatory organ (in connection with the corresponding striated area of the movable process).[1] Posterior margin of proximal arm of sternum IX more irregular than that of *P. phobos*; the distal arm bears 2 modified setae, the one at the ventral margin being spiniform with a slightly curved apical part, the other is extremely short and has a very blunt apex.

Length of male, 2 mm.

Remarks. If the relative development of the genal spines in the two sexes of this new species is the same as it is in *P. phobos* (where these spines are well developed in the male and strongly reduced in the female), the unknown female of *P. phyllisae* might be expected to possess at most vestiges of genal spines, a condition confined in known Stephanocircidae to *Barreropsylla excelsa* Jordan (see the paper by K. Jordan in the same issue of this *Bulletin*).

The new species is named after Miss Phyllis T. Johnson, Entomologist of the Walter Reed Army Medical Center, Washington, D.C., in appreciation of her great interest in the flea fauna of South America.

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[1] Though the latter suggestion seems less likely than the first one, it would be of interest if South American entomologists would try out the experiments which Ossiannilsson performed with Auchenorrhynchous Homoptera (*Opusc. ent.*, 1946, 82–84) in order to prove whether or not these fleas can sing.

Family HYSTRICHOPSYLLIDAE

Subfamily ANOMIOPSYLLINAE

***Megarthroglossus jamesoni*, n. sp.**

(Figs. 33–36)

TYPE MATERIAL. Holotype male and allotype female: Pine Nut Mountains, Douglas County, Nevada, U.S.A., 25th March 1951, from the nest of *Neotoma cinerea*, collected by E. W. Jameson, Jr.

DIAGNOSIS. The new species belongs to the group of species of *Megarthroglossus* which normally have a pronotal ctenidium consisting of 16 spines, i.e., *M. sicamus* Jordan & Rothschild, *M. bisetis* Jordan & Rothschild and *M. becki* Tipton & Allred, and is easily separable from these in the male by the shape of sternum VIII, the posterior margin of which has no marked ventral incision, and moreover its posterior margin is almost straight and does not form a lobe; the female differs from the others of the group by the combination of the following characters: the possession of 3 antesensilial setae each side, sternum VII without a lateral sinus, and the appendix of the spermatheca being less than twice as long as its reservoir, which has no distinct " collar."

DESCRIPTION. HEAD AND THORAX (Fig. 33) similar to those of the other members of the genus; pronotal ctenidium consisting of 16 spines; abdominal terga I and II each with 1–1 apical spinelets respectively in the male; in the female there is only 1 spinelet on one side of tergum I.

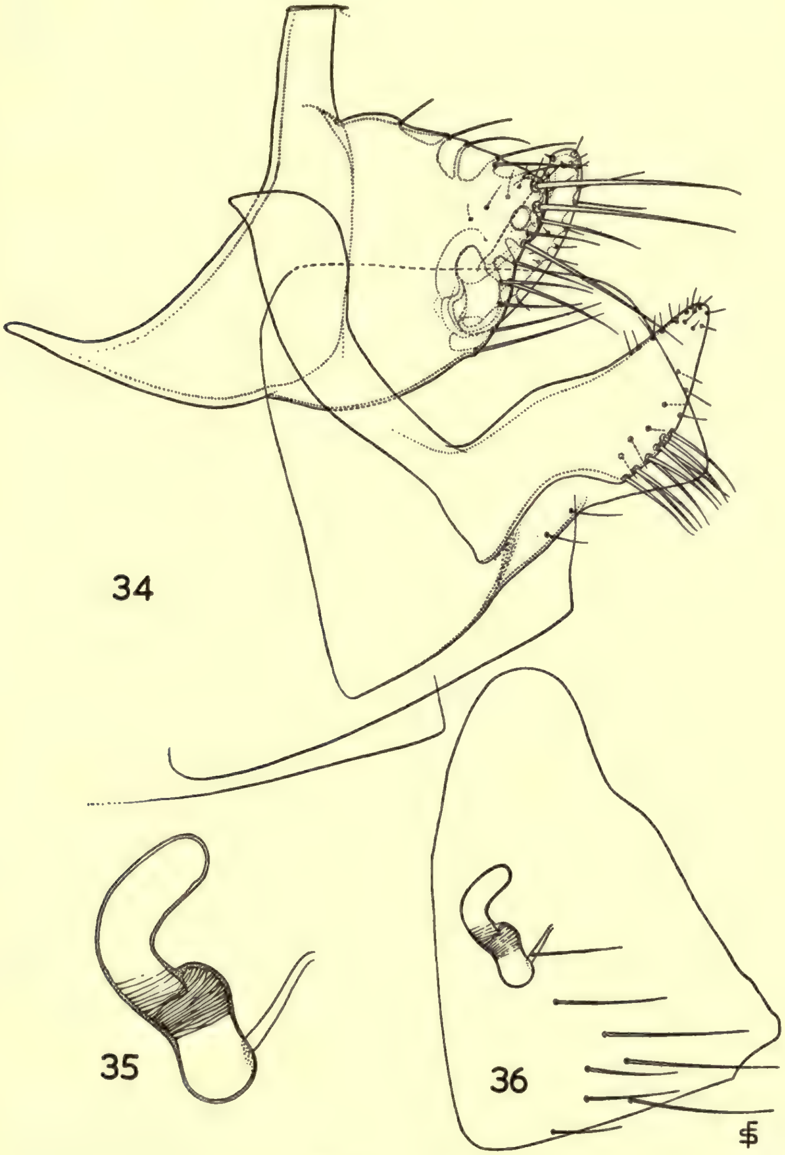
MODIFIED ABDOMINAL SEGMENTS: MALE (Fig. 34). Sternum VIII without a trace of a ventral incision of its posterior margin; the posterior hyaline part of this sternum with an almost straight posterior margin which forms no lobe; the length of the entire ventral margin of sternum VIII equals that of sternum VII. Clasper with 6 slender setae along its dorsal margin, a short row of about 6 small setae on its inner side from above the acetabulum to the dorso-apical angle and with 11 long and medium-sized setae distributed along the whole of the posterior margin. Movable process elongate, smoothly and slightly convex posteriorly, its apex obliquely truncate; none of its setae stout.

FEMALE (Figs. 35, 36). Tergum VII with 3 antesensilial setae each side. Posterior margin of sternum VII with a ventral sinus but without a lateral sinus; with a main row of 5 setae and in front of the lower setae about 3 additional ones. Appendix of spermatheca about one and a half times as long as the reservoir, the " collar " of which (the part which is striated on the inside) only bulges dorsally, while the lower margin of this collar is straight and in line with the lower basal margin of the appendix.

LENGTH of male, 1½ mm.; female, 2 mm.

REMARK. This new species of the Western North American genus *Megarthroglossus* is named after my colleague Dr. E. W. Jameson, Jr., of the University of

California, who himself collected the two specimens, and most kindly allowed me to describe them and to incorporate the holotype and allotype in the British Museum collection at Tring.



FIGS. 34–36.

Fig. 34, *Megarthroglossus jamesoni* n. sp. Clasper, sterna VIII and IX. (Holotype.) Fig. 35, *Megarthroglossus jamesoni* n. sp. Spermatheca. (Allotype.) Fig. 36, *Megarthroglossus jamesoni* n. sp. Sternum VII and spermatheca. (Allotype.)

Subfamily CTENOPHTHALMINAE

***Palaeopsylla similis peusi,* n. ssp.**

(Figs. 37 and 39)

TYPE MATERIAL. Holotype male and allotype female: Zerma, Rui Mountain, East Serbia (on the border of Bulgaria, 42° 54′ N. 22° 33′ E.), 25th July, 1935, ex *Talpa europaea pančići* (= *Talpa europaea europaea*), collected by N. Zemčuznikov. Paratypes: two males and one female with same data as holotype and allotype.

DIAGNOSIS. Separable from the nominotypical subspecies, *Palaeopsylla similis similis* Dampf, in the male by the convex dorsal margin of the clasper, by the wider base and narrower apex of the movable process and by the more strongly serrate posterior margin of the proximal arm of sternum IX; in the female by the shape of sternum VII, the posterior margin of which has no sinus below its dorsal lobe.

DESCRIPTION. Except for differences in the terminal segments, the new subspecies is indistinguishable from the nominotypical subspecies.

MODIFIED ABDOMINAL SEGMENTS: MALE (Fig. 37, cf. Fig. 38). Dorsal margin of corpus of clasper distinctly convex, its dorso-apical angle rather acute and projecting a little above the point of insertion of the seta on the posterior margin. Manubrium similar to that of the nominotypical subspecies, and like that of the latter showing a certain amount of variation in its width. Movable process of clasper straight, with a broad triangular base; the anterior (or dorsal) margin narrows abruptly near the apex, and from the apical angle the margin rounds off to continue as the posterior margin; in the nominotypical subspecies the anterior margin is smoothly rounded near the apex, but the apical and posterior margins meet at a right angle. Chaetotaxy of the movable process in the two subspecies rather similar. Sternum IX in subspecies *peusi* is very similar to that of the nominotypical subspecies, but the posterior margin of the proximal arm is much more strongly serrate over a somewhat longer distance; also the apex of the distal arm widens a little less abruptly.

FEMALE (Fig. 39, cf. Fig. 40). Sternum VII with a row of 5 or 6 stout setae, as in the nominotypical subspecies, but the uppermost seta is shifted more forwards (backward from the row); the posterior margin of this sternum has a broad dorsal lobe below which the margin slants backwards, but without forming a distinct sinus, as is the case in the nominotypical subspecies. The reservoir of the spermatheca seems to be narrower than that of *P. similis similis*, but such forms also occur in the latter, where likewise the part near the orifice may sometimes be distended ventrad.

LENGTH of male, 1¾–2 mm.; female, 2½ mm.

REMARKS. *Palaeopsylla similis similis* Dampf is widely distributed in Eastern Europe and is known to occur in East and South-east Germany, Austria, Hungary, Northern Yugoslavia, Roumania, Bulgaria and European Russia; throughout its range of distribution it is a specific parasite of the mole (*Talpa europaea*).[1] *P.*

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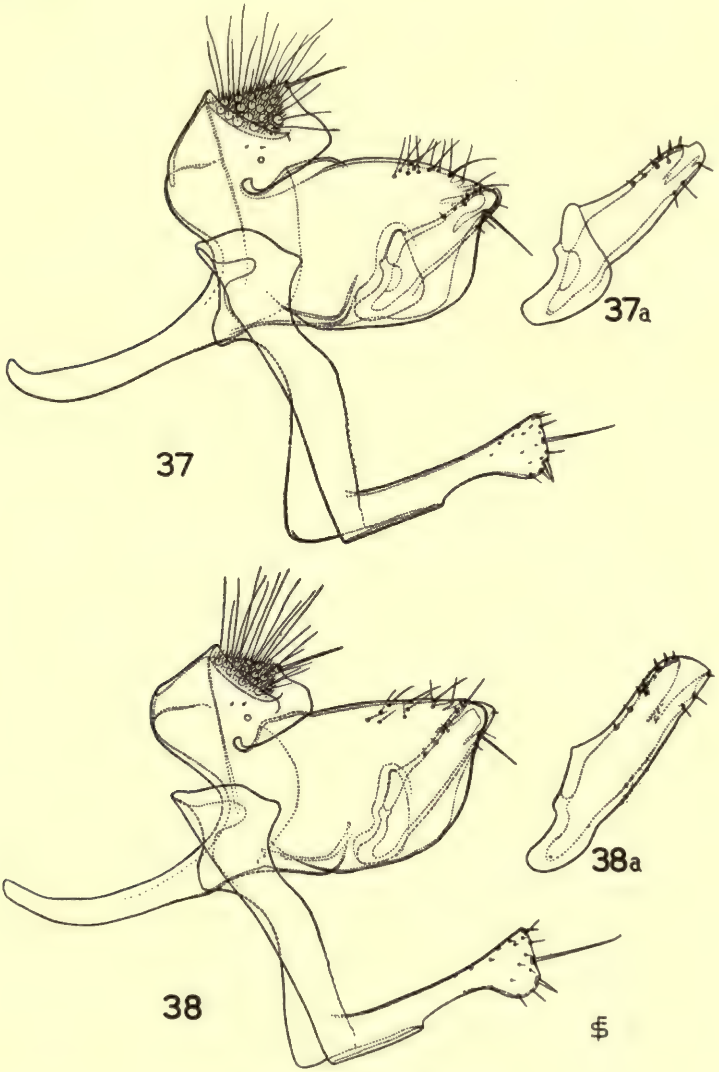
[1] The occurrence of one specimen, which is in the Tring collection, on *Sorex araneus*, caught on the Glatzer Schneeberg, Silesia, is beyond any doubt accidental, since other specific parasites of the mole are occasionally found on *Sorex* and vice versa.

similis peusi is so far only known from the Rui Mountain on the Serbian-Bulgarian border, and there also is a specific parasite of the mole. The Rui Mountain may well be one of the most north-eastern points of distribution of *P. s. peusi*, since *P. s.*



FIGS. 37, 37*a*, 38, 38*a*.

Fig. 37, *Palaeopsylla similis peusi* n. ssp. Clasper and sternum IX. (Holotype.) Fig. 37*a*, *Palaeopsylla similis peusi* n. ssp. Movable process of clasper. (Holotype.) Fig. 38, *Palaeopsylla similis similis* Dampf. Clasper and sternum IX. (Nove Stbske, Pleso, High Tatra.) Fig. 38*a*, *Palaeopsylla similis similis* Dampf. Movable process of clasper. (Nove Stbske, Pleso, High Tatra.)

similis has been found in south-west Bulgaria at Rhodope and Karlik, which localities are situated south-easterly of the Rui Mt. The new subspecies probably occurs in Albania and the northern part of Greece.

I have great pleasure in naming this new subspecies after my friend and colleague Prof. Dr. F. Peus, who, through his excellent work, has contributed greatly to our knowledge of European fleas.

Family ISCHNOPSYLLIDAE

Subfamily ISCHNOPSYLLINAE

Description of the hitherto unknown male of ***Ischnopsyllus consimilis*** (Wahlgren), 1904.

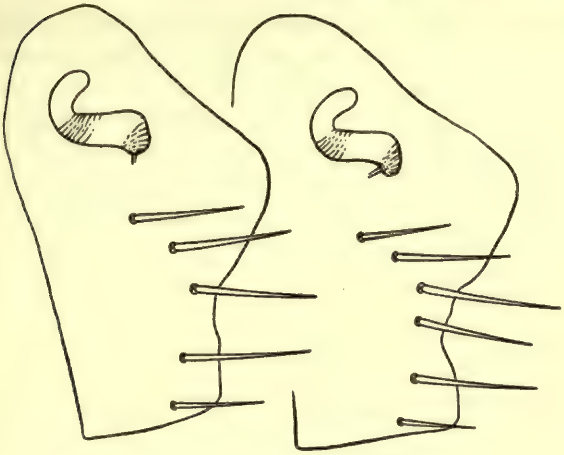
(Figs. 41, 43, 44)

Lt.-Col. R. Traub, Chief of the Department of Entomology, Walter Reed Army Medical Center in Washington, D.C., most kindly sent me a male of an Egyptian bat flea of the genus *Ischnopsyllus* for study and comparison with the representatives of this genus in the Tring collection. Though this male does not agree with any described male of *Ischnopsyllus*, albeit closely related to *I. octactenus* (Kolenati), I thought it could well be the unknown male of *Ischnopsyllus consimilis* (Wahlgren), 1904, which was described from a single female collected in the neighbourhood of Cairo, Egypt, ex *Rhinopoma microphyllum* ; unfortunately this type-specimen must be considered lost. From Wahlgren's description one deduces that *consimilis* must be extremely closely related to *octactenus*, and it was even thought that it might be a synonym of the latter. The description of *I. consimilis* deals mainly with such unsatisfactory characters as counts of setae, which agree rather well with the numbers of the Egyptian male (taking into account small differences which may be sexual) ; the numbers of spines in the ctenidia of the two sexes agree very well. Since both the female holotype of *I. consimilis* and the Egyptian male *Ischnopsyllus* are closely related to *I. octactenus*, and differ from it in similar respects, it seems a safe assumption that the male belongs to Wahlgren's species.

I am greatly indebted to Colonel Traub and also to the collector of this male, Mr. P. Quentin Tomich, for allowing me to describe the specimen. It is characteristic of Colonel Traub's great generosity that he has presented this unique specimen to the British Museum collection of Siphonaptera at Tring.

DATA. One male ex *Pipistrellus kuhli*, 5 miles west of Simbellawein (i.e., 12 miles south of Mansura), Dakahlia Province, [Lower] Egypt, 26th February, 1947, collected by P. Quentin Tomich.

DIAGNOSIS. Closely related to *Ischnopsyllus octactenus* (Kolenati), but differs in the following characters : mesonotum and metanotum each with only a few semi-erect setae forming a " mane " ; dorso-apical angle of clasper obtuse, strongly rounded ; sternum VIII broader, with an oblique and rounded apex ; sternum IX



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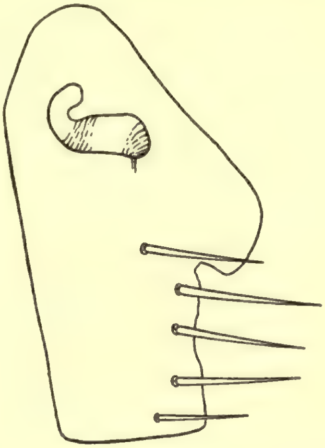

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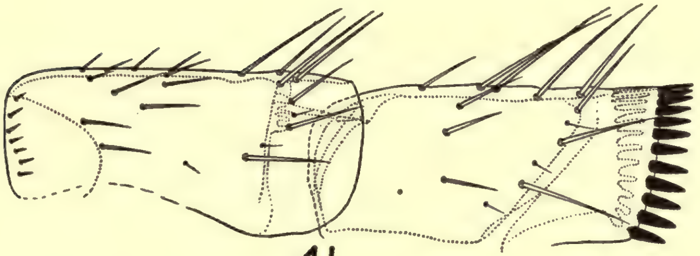

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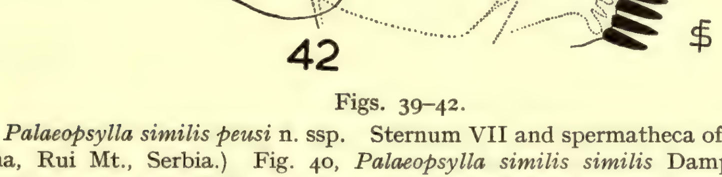

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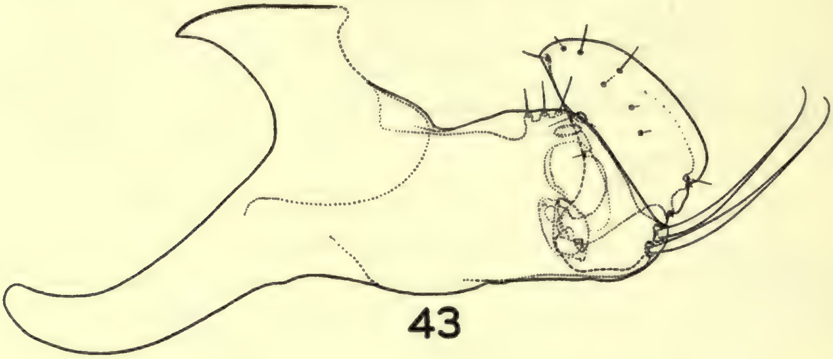
Figs. 39–42.

Fig. 39, *Palaeopsylla similis peusi* n. ssp. Sternum VII and spermatheca of two females. (Zerma, Rui Mt., Serbia.) Fig. 40, *Palaeopsylla similis similis* Dampf. Sternum VII and spermatheca. (Moscow, Russia.) Fig. 41, *Ischnopsyllus consimilis* (Wahlgren). Mesonotum and metanotum of male. (Simbellawein, Egypt.) Fig. 42, *Ischnopsyllus octactenus* (Kolenati). Mesonotum and metanotum of male. (S. Felíu de Guixols, Spain.)

differs in details of the apical half of the distal arm ; crochet of phallosome with an upturned apex. Female : From the information available (i.e., Wahlgren's original description) the only difference from *I. octactenus* seems to be in the number of spines in the pronotal ctenidium, namely 26 as against 29–32 in *I. octactenus*, though this difference may not be genuine, since Wahlgren stated, " Da ich nur ein Exemplar zu untersuchen gehabt habe, sind die Stachelzahlen der grösseren Kämme (der beiden thorakalen und des zweiten und dritten abdominalen) insoweit unsicher, als ein Irrtum bis auf zwei Stacheln nicht völlig ausgeschlossen ist."



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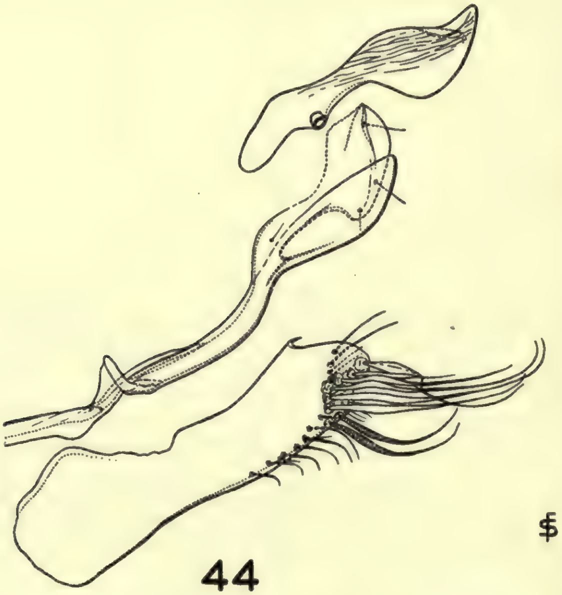

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FIGS. 43, 44.

Fig. 43, *Ischnopsyllus consimilis* (Wahlgren). Clasper. (Simbellawein, Egypt.) Fig. 44, *Ischnopsyllus consimilis* (Wahlgren). Aedeagal crochet, sternum IX and sternum VIII. (Simbellawein, Egypt.)

DESCRIPTION. The number of spines in the eight ctenidia of *I. consimilis* and *I. octactenus* are compared below :

	I. consimilis ♂	*I. octactenus* ♂	*I. consimilis* ♀	*I. octactenus* ♀
Pronotum	25	28–31	26	29–32
Metanotum	25	28–32	24	25–31
Tergum I	12	11–18	12	11–15
,, II	22	20–28	20	21–27
,, III	20	19–22	18	16–22
,, IV	17	15–18	18	13–18
,, V	13	11–16	14	9–14
,, VI	13	9–13	12	9–13

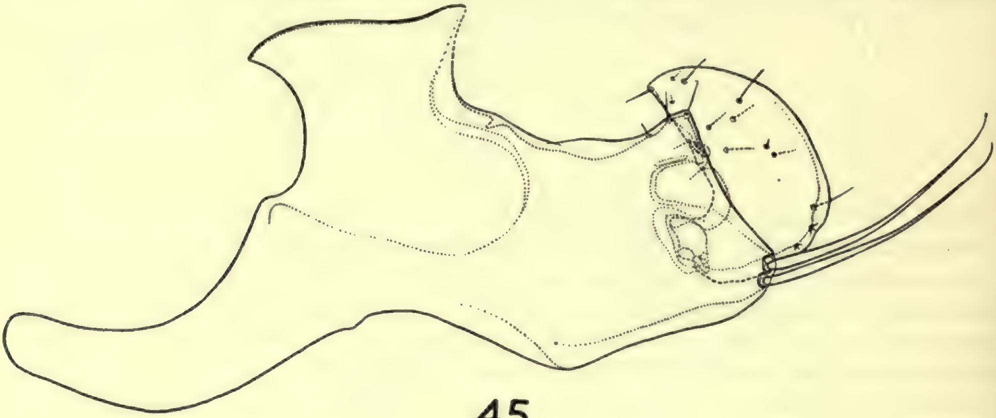
HEAD. Practically indistinguishable from that of *I. octactenus*.

THORAX. Pronotum like that of *I. octactenus*, except for the number of spines in the ctenidium ; mesonotum and metanotum each with about 4 or 5 semi-erect setae near the dorsal margin (Fig. 41), while in *I. octactenus* these are much more numerous (Fig. 42). In other respects the thorax, as also the legs, show no noticeable differences between the two species under discussion.

ABDOMEN. Segments I–VII similar to those of *I. octactenus* ; for the numbers of spines in the tergal ctenidia, see above.

MODIFIED ABDOMINAL SEGMENTS OF MALE (Figs. 43, 44, cf. Figs. 45, 46). Apodeme of tergum IX rather broad ; manubrium curved upwards, narrowing towards the apex ; the upper margin of the manubrium near the ventro-anterior part of the margin of the apodeme shows no lobe as in *I. octactenus*, but this lobe is also quite frequently absent, or at most indicated, in the latter species, so it is likely that specimens of *I. consimilis* possessing this lobe may be found in the future. The dorso-apical angle of the clasper is strongly obtuse and rounded off ; along the dorsal margin near the angle there are the usual 3 small setae ; posterior margin of clasper almost straight ; of the 2 acetabular setae the lower is slightly stouter than the upper ; the ventral margin of the clasper forms a rather straight line. Movable process of clasper crescentic, the lower half of the posterior margin fairly straight, while in *I. octactenus* it is more regularly rounded ; chaetotaxy of the movable process similar to that of the latter. Sternum VIII fairly broad and straight, its proximal part being widened ; dorsal margin of the distal part concave, but much less so than in *I. octactenus* ; its apical margin obliquely rounded, and at the angle where the dorsal and apical margins meet there is a minute spiniform seta (in *I. octactenus* a small thin seta). On the apico-ventral part of the sternum a curved row of 6 blade-shaped long setae and in front of these, at the ventral margin, 2 more flattened setae, but like the corresponding ones in *I. octactenus* these are heavily pigmented ; further proximad along the margin some 6 curved setae. Sternum IX with the distal arm apically divided into a setiferous upper lobe and a lower non-setiferous one ; the latter lobe, which is the outer, is elongated and widest in its middle (in *I. octactenus* it is triangular and widest at its base) ; the upper part of the widened apical portion of the inner lobe much longer (from the point of junction with the inner lobe to the apex) than the lower part (in *I. octactenus* the upper and lower parts are subequal in size). Aedeagus not substantially different from that of *I. octactenus*, but the crochet differs by having amongst other things an upturned apex; other differences can be observed by comparing Fig. 44 with Fig. 46.

LENGTH of male, 2 mm.



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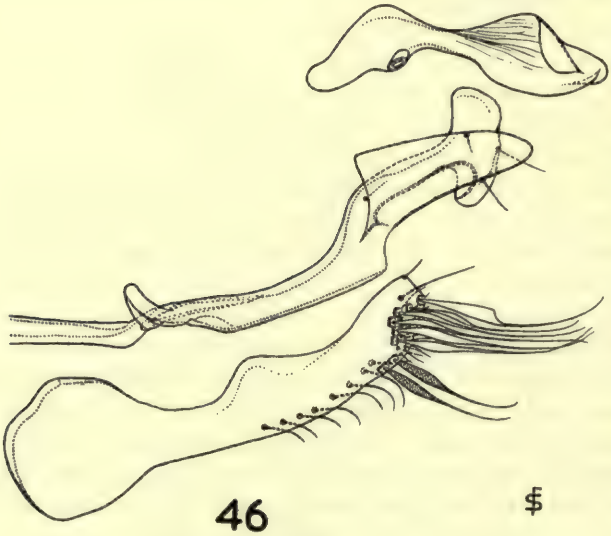

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FIGS. 45, 46.

Fig. 45, *Ischnopsyllus octactenus* (Kolenati). Clasper. (Newport, Isle of Wight.)
Fig. 46, *Ischnopsyllus octactenus* (Kolenati). Aedeagal crochet, sternum IX and sternum VIII. (Newport, Isle of Wight.)

REMARK.—In view of the desirability of stability in nomenclature I designate the above described Egyptian male *Ischnopsyllus* as neotype of *Ischnopsyllus consimilis* (Wahlgren), 1904.

Family AMPHIPSYLLIDAE

Subfamily MESOPSYLLINAE

Redescription of ***Caenopsylla assimulata*** (Weiss), 1913, in comparison with ***Caenopsylla mira*** Rothschild, 1909.

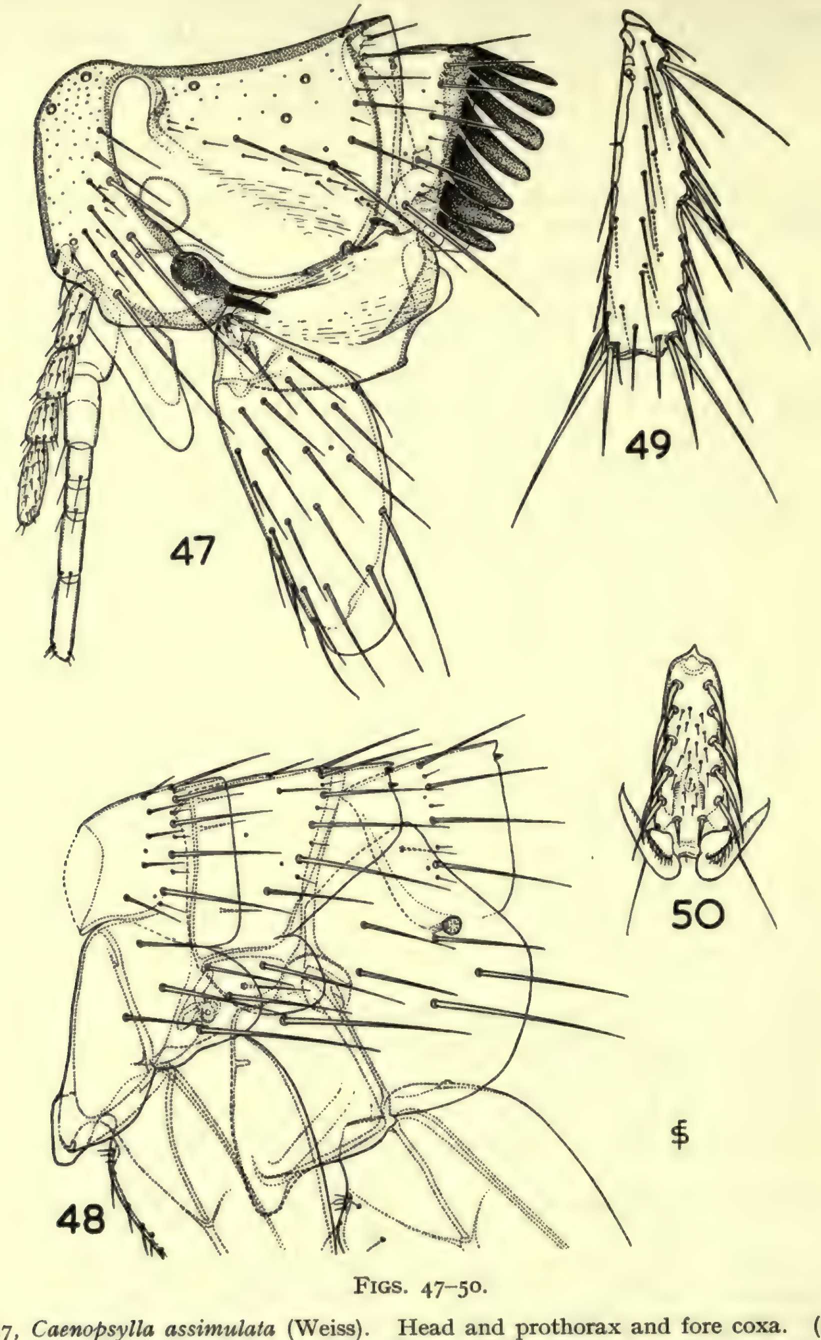
(Figs. 47–53, cf. Figs. 54–62)

Through the great kindness of Prof. E. Séguy, Sous-Directeur au Muséum National d'Histoire Naturelle, Paris, I have been able to study the male holotype of *Caenopsylla assimulata* (Weiss), which is the only known specimen of this species. Although Weiss (1913) described it at length, its true morphology and status could not be ascertained owing to the fact that the few sketchy drawings published by Weiss do not show the true diagnostic characters. It is therefore not surprising that Wagner & Wassilieff (1933) remark that ". . . le *C. assimulata* Weiss a été trouvée en Tunisie, à Matmata, sur le *Macroscelides rozeti*, mais un seul exemplaire insuffisamment décrit par A. Weiss." It is, however, not really a matter of the species being insufficiently described, since Weiss devoted nine full pages to the description of the sole specimen, but lack of detailed figures is liable to render any description, however lengthy, practically useless in the case of creatures such as fleas, where so much depends on the shape of the details of complicated structures. I fully agree with Dampf (1945), who advocates more exactness in drawings, but I would like to add that all taxonomically important parts of fleas should be treated in such a way. Detailed and accurate drawings replace, in a much more satisfactory way, large numbers of pages of descriptive matter—a fact which unfortunately is not yet wholly appreciated by many editors of periodicals. The extra expense of reproducing figures is probably more than offset by the saving in the number of pages required for a description, to say nothing of the fact that in nearly all instances descriptions of fleas unaccompanied by good and adequate figures are practically useless.

The holotype of *Caenopsylla assimulata* is not well cleared and its dorsum is much contracted ; the specimen is in the collection of the Muséum National d'Histoire Naturelle at Paris.

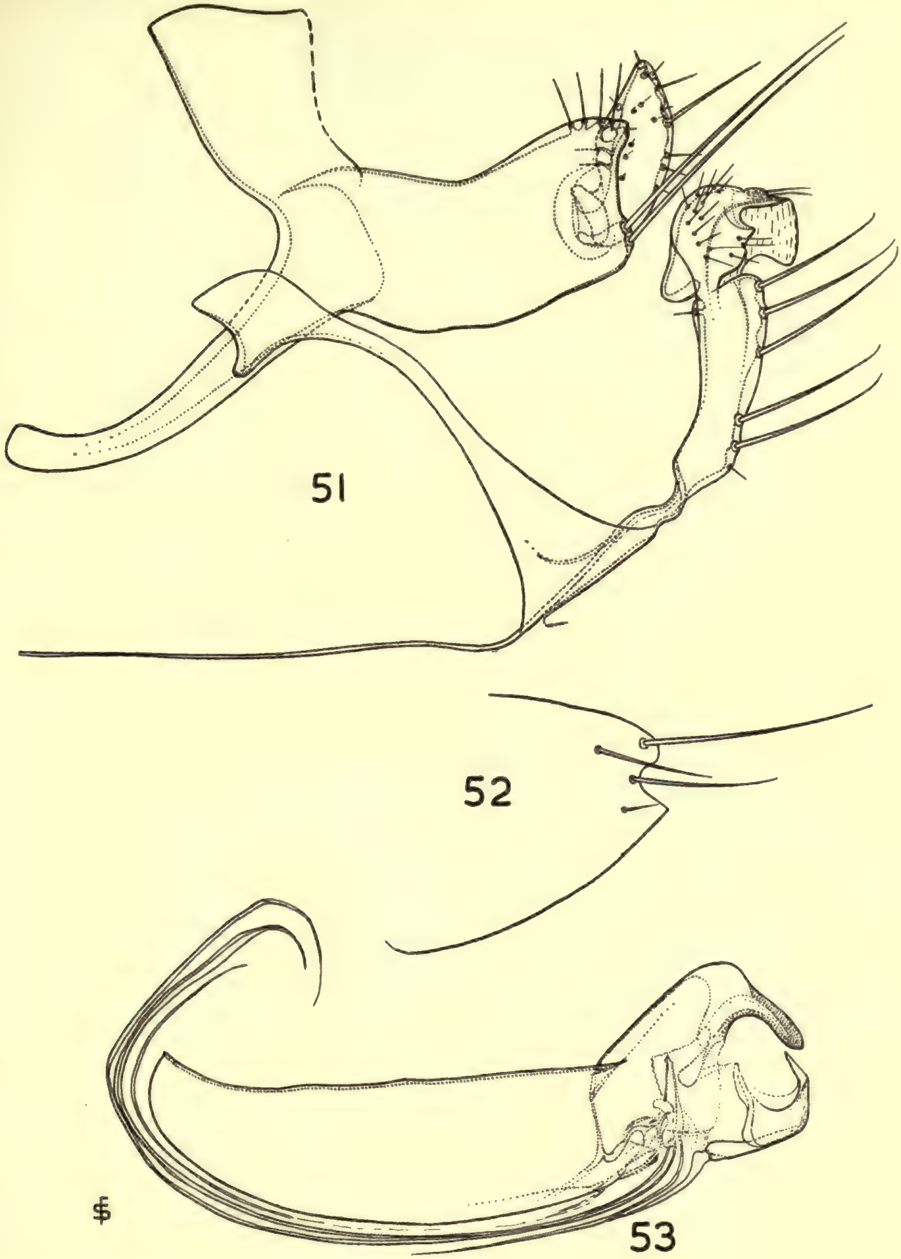
Only one other species of *Caenopsylla* is known, *C. mira* Rothschild, 1909, and therefore it seemed advisable to redescribe *C. assimulata* in comparison with *C. mira*.

Caenopsylla assimulata (Weiss), ♂	*Caenopsylla mira* Rothschild, ♂
DIAGNOSIS	
Pronotum rather narrow dorsally, its ctenidium straight. Hind tibia without a well-developed false comb of setae at the posterior margin. Corpus of clasper with subparallel dorsal and ventral margins ; 2 acetabular setae.	Pronotum much longer dorsally than ventrally, its ctenidium strongly curved. Hind tibia with a distinct false comb. Corpus of clasper narrowest in its middle part, the fixed process being drawn out into a long lobe ; 4 acetabular setae.



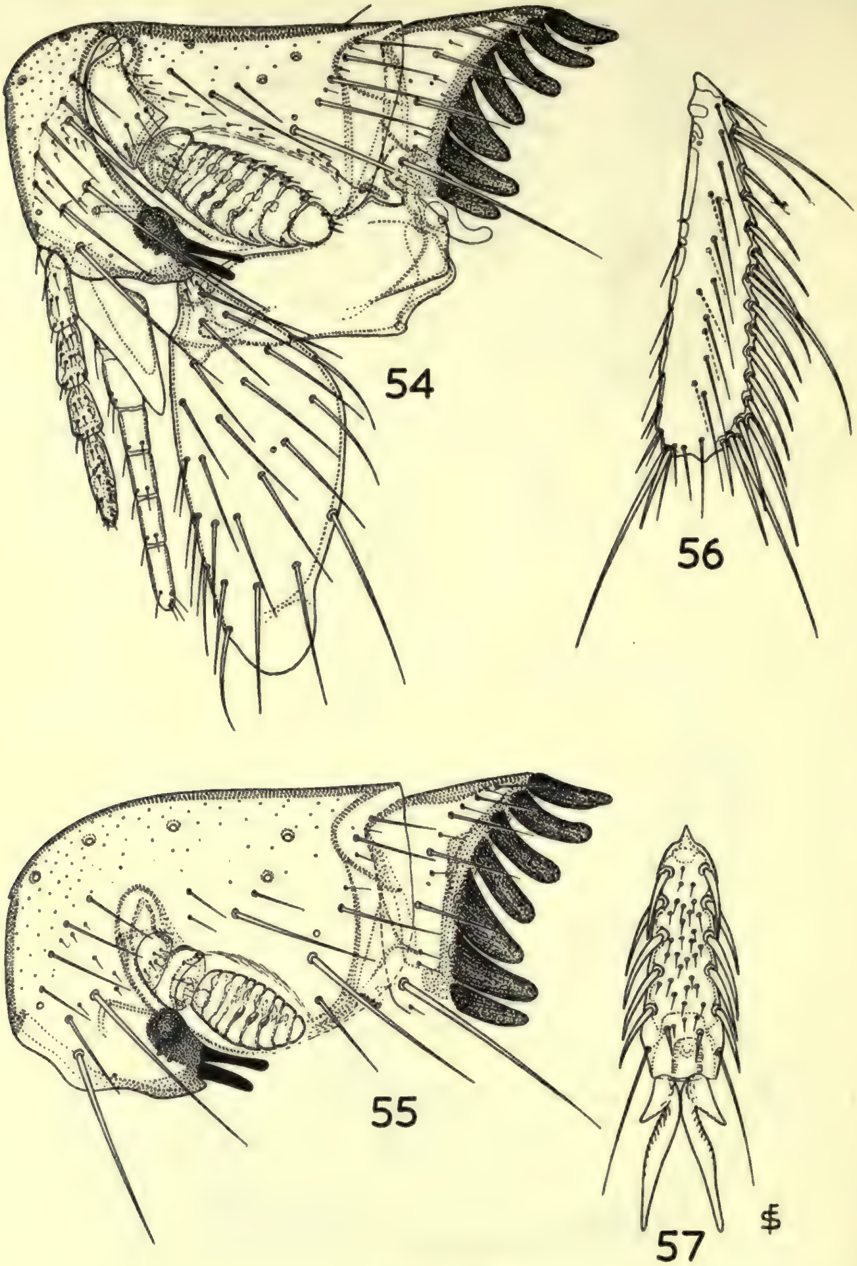
FIGS. 47–50.

Fig. 47, *Caenopsylla assimulata* (Weiss). Head and prothorax and fore coxa. (Holotype.) Fig. 48, *Caenopsylla assimulata* (Weiss). Mesothorax, metathorax and tergum I. (Holotype.) Fig. 49, *Caenopsylla assimulata* (Weiss). Hind tibia. (Holotype.) Fig. 50, *Caenopsylla assimulata* (Weiss). Last hind tarsal segment. (Holotype.)



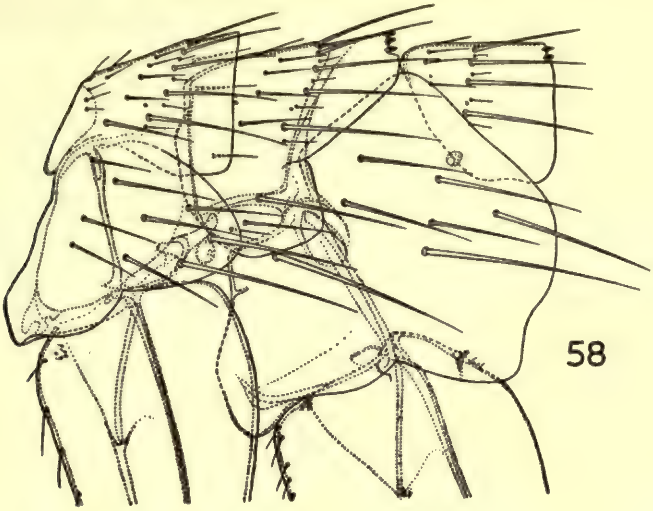
FIGS. 51–53.

Fig. 51, *Caenopsylla assimulata* (Weiss). Clasper and sternum IX. (Holotype.) Fig. 52, *Caenopsylla assimulata* (Weiss). Sternum VIII. (Holotype.) Fig. 53, *Caenopsylla assimulata* (Weiss). Phallosome. (Holotype.)



FIGS. 54–57.

FIG. 54, *Caenopsylla mira* Rothschild. Head, prothorax and fore coxa of male. (Holotype.) Fig. 55, *Caenopsylla mira* Rothschild. Head and pronotum of female. (Biskra, Algeria.) Fig. 56, *Caenopsylla mira* Rothschild. Hind tibia. (Holotype.) Fig. 57, *Caenopsylla mira* Rothschild. Last hind tarsal segment. (Holotype.)



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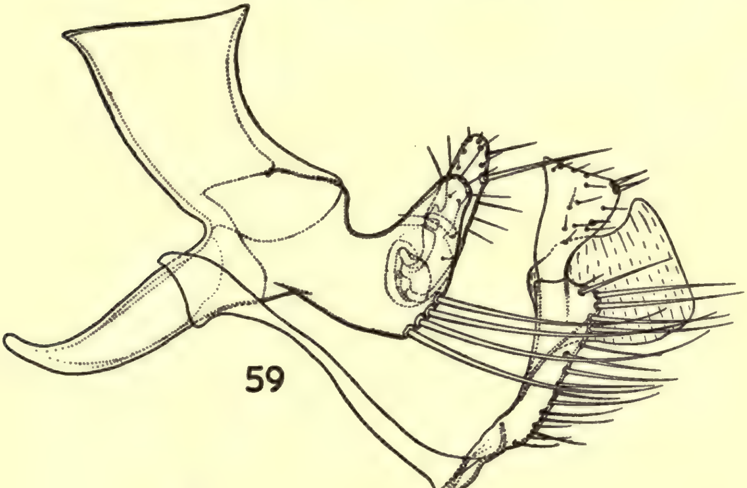

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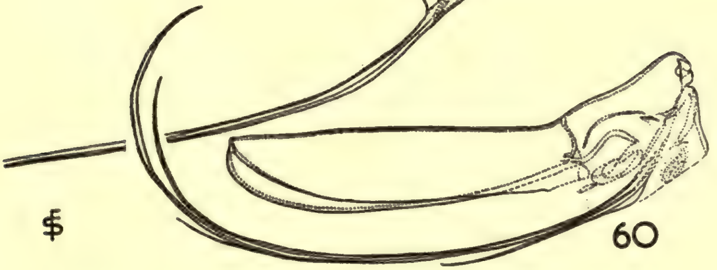

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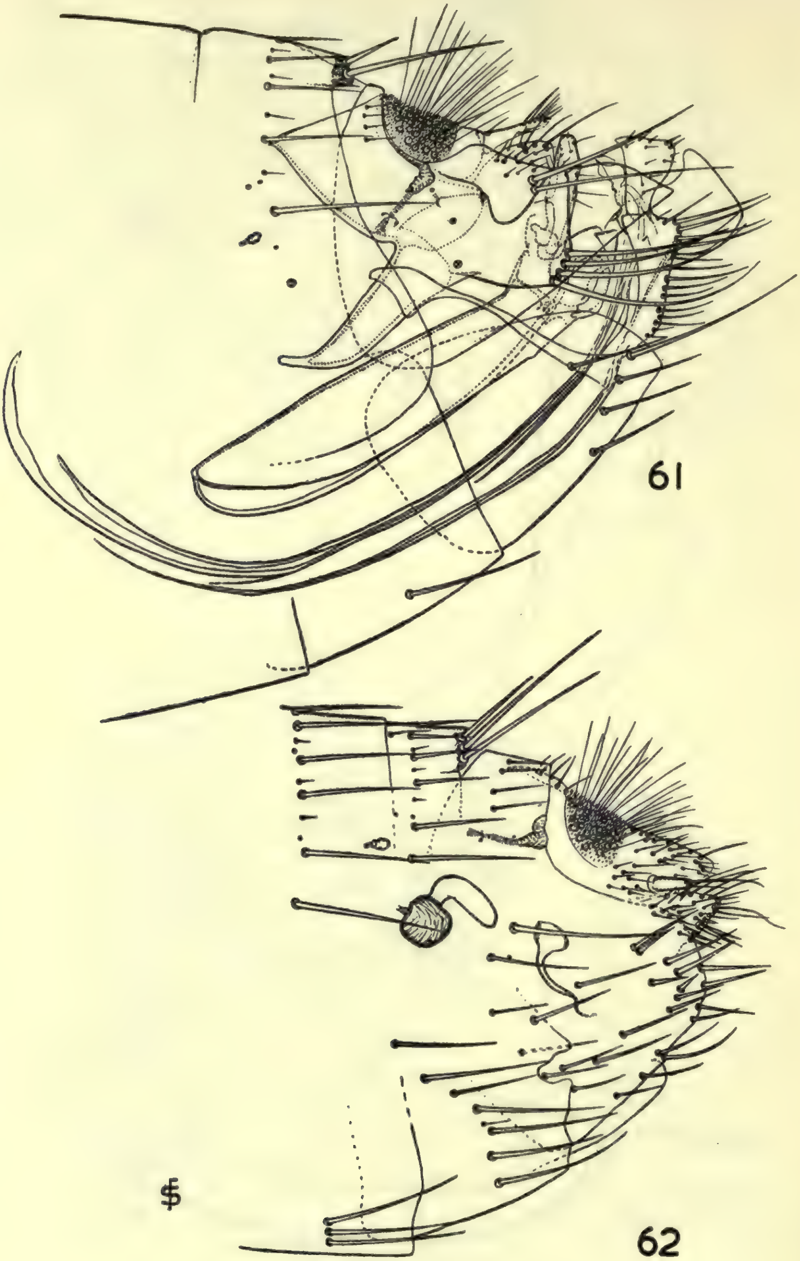
FIGS. 58–60.

Fig. 58, *Caenopsylla mira* Rothschild. Mesothorax, metathorax and tergum I of male. (El Kantara, Algeria.) Fig. 59, *Caenopsylla mira* Rothschild. Clasper and sternum IX. (Holotype.) Fig. 60, *Caenopsylla mira* Rothschild. Phallosome. (Holotype.)



Figs. 61, 62.

Fig. 61, *Caenopsylla mira* Rothschild. Terminalia of male. (Holotype.) Fig. 62, *Caenopsylla mira* Rothschild. Terminalia of female. (Biskra, Algeria.)

DESCRIPTION

Caenopsylla assimulata (Weiss), ♂	*Caenopsylla mira* Rothschild, ♂
HEAD (Fig. 47). The chaetotaxy, as well as the other characteristics of the head, can be seen in the figure, but stress should be laid upon the presence of 2 genal spines (though normal in the subfamily), the upper one of which is much thinner than the lower ; of the five-segmented labial palp the 2nd and 3rd segments are subequal in length and each is about half the length of the 4th or 5th segments. The clava of each antenna is broken off, and although on the slide label is written that they are somewhere in the preparation, I have been unable to find them ; pedicellus with 3 short setae.	HEAD (Figs. 54, 55). Chaetotaxy very much the same, but the posterior row on the postantennal region is oblique and subparallel to the row on the pronotum. The 2 genal spines are slightly stouter ; segments 2–4 of the five-segmented labial palp are all of subequal length and slightly shorter than segments 1 and 5. The antenna is shown in the figures ; the pedicellus also bears only 3 small setae.
THORAX (Figs. 47, 48). Pronotum of normal shape, with one row of 12 setae (6 each side) ; pronotal ctenidium consisting of 14 spines, the uppermost of the group formed on each side by the 3 lowest spines, which all lie closely against each other, is much the stoutest in the ctenidium and points obliquely downwards ; the upper 4 spines on each side are slightly curved and the 2nd and 3rd from above are somewhat spatulate ; they are all directed downwards like the third spine from below.	THORAX (Figs. 54, 55, 58). Pronotum in both sexes much longer dorsally than ventrally, with one row of 12 setae ; pronotal ctenidium consisting of the same number of similar spines, but the ctenidium is strongly curved and the 4 dorsal spines on each side are directed backwards and downwards, also the second and third from above are much less spatulate.
Mesonotum with a main row of 10 setae (5 each side), preceded by a row of 10 much smaller setae, both rows practically vertical. Mesosternosome with 6 setae on one side and 7 on the other ; the anterior margin of the mesepisternum is long and almost vertical.	Mesonotum with a main row of 10 setae on both sides together, preceded by a row of 10 smaller setae ; these two rows are arranged obliquely. Mesosternosome with 8–9 setae ; anterior margin of mesepisternum more oblique.
Metanotum with a main row of 12 setae preceded dorsally by only 4 small setae ; its posterior margin bears dorsally two apical spinelets on each side ; metepisternum with one long and one short seta ; metepimeron with 5 setae on one side and 6 on the other.	Metanotum with a main row of 10 setae, preceded by a row of 8–10 setae ; its posterior margin bears dorsally 3 apical spinelets on each side ; metepisternum also with one long and one short seta ; metepimeron extending upwards much nearer to dorsum, with 6 setae.
LEGS (Figs. 49, 50). Hind tibia with an indistinct false comb of 8 setae along the posterior margin ; the five pairs of lateral plantar setae on the fifth segment of the hind tarsus are rather slender, on the plantar surface about 20 minute setae.	LEGS (Figs. 56, 57). The setae of the hind tibia forming a false comb number 12 and are stouter, hence the false comb is very distinct ; the five pairs of lateral plantar setae are stouter and there are about 30 minute setae on the plantar surface.

DESCRIPTION

Caenopsylla assimulata (Weiss), ♂

Abdomen. Terga I and II each with one apical spinelet each side; terga I–VII respectively each with 4, 6, 6, 6, 6, 5, 4 setae in the main row on each side; on tergum VII the gap between the lowest seta and its neighbour is twice as long as the space between the 1st and 2nd or 2nd and 3rd. In front of the main row one seta on terga I and II, none at all on terga III–VII. Tergum VII with 3 antesensilial setae the lowest of which is very small. Basal sternum apparently without setae, sterna III–VII on each side with 2 setae, sternum VIII as in Fig. 52, its apical margin with a sinus.

Modified segments (Fig. 51). Shape of tergum VIII not visible in the specimen, but it bears 3 long setae. Manubrium of clasper long and narrow, not tapering in its apical portion. Corpus of clasper with subparallel dorsal and ventral margins, its apical half directed upwards; 4 slender setae along the dorsal margin near the apex; posterior margin of clasper slightly concave; 2 acetabular setae. Movable process spindle-shaped, two and a half times as long as its maximum width; besides a number of small setae it bears a fairly large one at the posterior margin at one-third its length from the apex. Apex of proximal arm of sternum IX squarish; the greater part of this arm very narrow but it widens to a triangle with a rather long base. The distal arm bears ventrally 5 long setae, and its structure is complicated and is shaped as shown in Fig. 51; the membranous flap projecting from behind the apex may belong to this sternum or it may be the aedeagal crochet; this could not be ascertained, no material being available for dissection. Aedeagal apodeme broad; for details of the phallosome, see Fig. 53.

Length. 1½ mm.
Habitat. Matmata, South Tunisia.

Host. *Elephantulus rozeti* (which was collected by Weiss in March, 1913); it may be expected to occur on the Gundi.

Caenopsylla mira Rothschild, ♂

Abdomen. Terga I–III with 2–2, 1–1, 1–1 apical spinelets respectively; terga I–VII normally respectively each with 4, 6, 6, 6, 6, 6, 6 setae in the main row on each side; the setae on tergum VII are all about equally spaced. In front of the main row of terga I–III respectively 2–3, 3–4, 1–3 small setae, none at all on terga IV–VII. Similar antesensilial setae. Basal sternum with one seta along the ventral margin on each side, sterna III–VII each with 2 or 3 setae on each side, sternum VIII as in Fig. 61, its apical margin not sinuate.

Modified segments (Figs. 59, 61). Tergum VIII roughly triangular, its dorsal margin undulate, and apically this margin and the ventral one meet at a sharp angle; 2 long setae near the dorsal margin. Manubrium much broader and tapering strongly apically. Corpus of clasper with a deep sinus in its dorsal margin, which divides off the fixed process as a very distinct lobe, bearing at its apex 5 slender setae; most of the posterior margin of the clasper slightly convex; 4 acetabular setae. Movable process elongate, four times as long as its maximum width; chaetotaxy similar, but the long seta at the posterior margin is inserted at one-fourth the length of the posterior margin from the apex. Apex of proximal arm of sternum IX triangular, the narrow arm widening only a little towards its junction with the distal arm. The distal arm bears ventrally a large number of small, medium-sized and long setae; its divided-off apical part triangular, very differently shaped to that of the other species, details as in Fig. 59; the membranous flap is much larger. Aedeagal apodeme much narrower; for details of the phallosome, which is very different, see Fig. 60.

Length. ♂, 2–2¼ mm.; ♀, 2¼–2½ mm.[1]
Habitat. Biskra and El Kantara, both in Algeria.

Host. *Ctenodactylus gundi* (occurring in Libya, Tunis, Algeria, and west to the Moroccan Atlas); the occurrence of one specimen on *Eliomys quercinus munbyanus* may be accidental.

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[1] Although the female sex of this species is not dealt with here, it seemed useful to give a figure of its terminalia (Fig. 62).

REMARKS

The difference in the development of the pronotum is of interest : in *C. assimulata* we see that the pronotum is still of a more or less normal shape, but its ctenidium shows a clear tendency towards the condition found in *C. mira*, where the pronotum is dorsally widened backwards, and as a result of this the ctenidium is strongly curved and the upper spines tend to point downwards. These are obviously two stages in the evolution of the pronotum in the genus *Caenopsylla*, and it would be of interest to know whether a species of this genus with the original straight pronotal spines still exists, and also whether or not the evolution in another species has gone further, producing a pronotum more or less like that of *Barreropsylla*. In order to find the answer to this question it will be necessary to collect intensively throughout North Africa, which may unfortunately mean a delay of many years.

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THE EARLY LITERATURE ON MALLOPHAGA

(PART III)

THERESA CLAY
AND
G. H. E. HOPKINS

BULLETIN OF
THE BRITISH MUSEUM (NATURAL HISTORY)
ENTOMOLOGY Vol. 3 No. 6
LONDON: 1954

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BY

THERESA CLAY

AND

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? refs.

PART III. 1776–1786

Pp. 221–266 ; *Pls.* 10–12 ; 68 *Text-figures.*

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THE EARLY LITERATURE OF MALLOPHAGA

By THERESA CLAY AND G. H. E. HOPKINS

(PART III, 1776–1786)

SYNOPSIS

This part, the third of a series of papers in which it is intended to review the species of Mallophaga described between 1758 and 1818, deals with the twelve species described by F. Schrank in 1776 and 1781; the two species by O. F. Müller in 1776; the single species by J. C. Fabricius in 1777; the seven species by De Geer in 1778; the seven species by O. Fabricius in 1780; the three species by A. F. Fourcroy in 1785; the single species described by Mohr in 1786.[1] As in previous instalments, the references following the headings are to the original work.

SCHRANK, 1776

(*Beyträge zur Naturgeschichte, Leipzig*: 113–120.)

WITH Schrank we reach much firmer ground than we have trodden hitherto, for all his species are quite reasonably well figured and there can be little doubt about the identity of any of them. All have, of course, been renamed (singly or in groups) by Nitzsch. The new species, all of which were published in perfectly valid form, are discussed below.

Pediculus curuccae (p. 113, Pl. 5, fig. 1).

The host is "*Motacilla curucca*" (= *Sylvia curucca*), and the figure shows a Menoponid resembling *Menacanthus* rather than *Myrsidea*. No subsequent author has anything particularly useful to say about it, but Nitzsch (1818: 300) renamed it *Liotheum* (*Menopon*) *minutum*. As no material from the type host is available, neotypes of *Menacanthus curuccae* (Schrank) cannot be erected.

Pediculus rubeculae (p. 115, Pl. 5, fig. 4)

No host is mentioned in the description, but the species is called "Rothkehlchenlaus," which is sufficient indication that the host was *Erithacus rubecula*; in a later work (1781: 507) Schrank gives the host as *Motacilla rubecula*. The figure is a reasonably good representation of a *Ricinus* and could not be mistaken for anything else.

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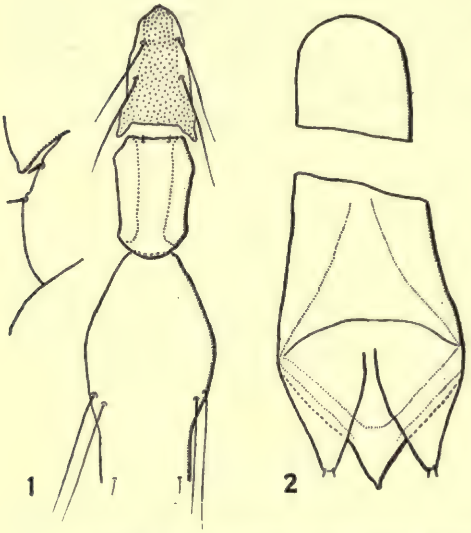
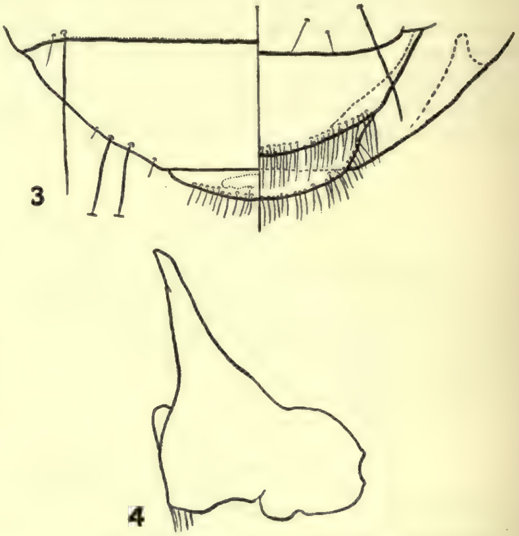
[1] In the last instalment of this series we remarked (*Bull. Brit. Mus.* (*Nat. Hist.*) *Entomology*, **2**: 4) that "Kéler has evidently not studied the early literature at all . . . '*equi* (Lin.),' for instance, does not exist, no species having been described under this name prior to 1842, when Denny described it." This remark is clumsily worded and suggests a reproach to Dr. von Kéler that we certainly did not intend. In ascribing the authorship of *equi* to Linné he was in conformity with nearly all recent writers on Mallophaga, since, with extremely few exceptions all have either ignored or overlooked the fact that ***Pediculus equi*** Linné is a ***nomen nudum***.

The species was again described by Olfers (1816 : 91) as *Nirmus pterocephalus*, a name which covers several species but which we are restricting to *Ricinus rubeculae*, and by Nitzsch (1866 : 121) as *Physostomum agonum*, both from the same host as Schrank's material. Harrison (1916 : 18, 68) correctly restores Schrank's name for the species, but then (p. 103) wrongly mentions it in *Philopterus* as well, probably through confusion with *Philopterus rubeculae* (Denny), which Harrison omits and which is not congeneric with *rubeculae* Schrank.

This species is at once distinguished from both *dolichocephalus* (Scopoli) (Clay and Hopkins, 1951 : 10) and *fringillae* De Geer (see below) by the form of the mandibles (Text-fig. 4). It is further distinguished from the former species by the shape of the head (Pl. 10, figs. 1, 2), the terminal segments of the female abdomen (Text-fig. 3) and prothorax, the form of the gular and prothoracic plates (Text-fig. 1), the male genitalia (Text-fig. 2), and by the absence of the colour pattern characteristic of *dolichocephalus*. From *fringillae* it is distinguished in the female by the shape of the head and prothorax, by the form of the gular and prothoracic plates, the number of gular setae, and by the chaetotaxy of the terminal segments of the female abdomen. No males of *fringillae* have been seen.





Figs. 1, 2.—*Ricinus rubeculae* (Schrank). 1. Gular and thoracic plates, female.
2. Male genitalia.

Figs. 3, 4.—*Ricinus rubeculae* (Schrank). 3. Terminal segments of female abdomen.
4. Mandible.

Neotype male (Pl. 10, fig. 1; Text-fig. 2) and *neallotype* female (Pl. 1, fig. 2; Text-figs. 1, 3, 4) of *Ricinus rubeculae* (Schrank) in the British Museum (Nat. Hist.) (slide no. 562) from *Erithacus r. rubecula* from Moravia, Czechoslovakia. *Neoparatypes*: 17 males and 50 females from *Erithacus rubecula melophilus* Hart. from the British Isles.

Measurements in mm.:

	Male		Female	
	Length	Breadth	Length	Breadth
Head	0.58	0·55	0·67	0·63
Prothorax	—	0·45	—	0·52
Abdomen	—	0·70	—	0·88
Total	2·34	—	3·02	—
Genitalia	0·38	—	—	—

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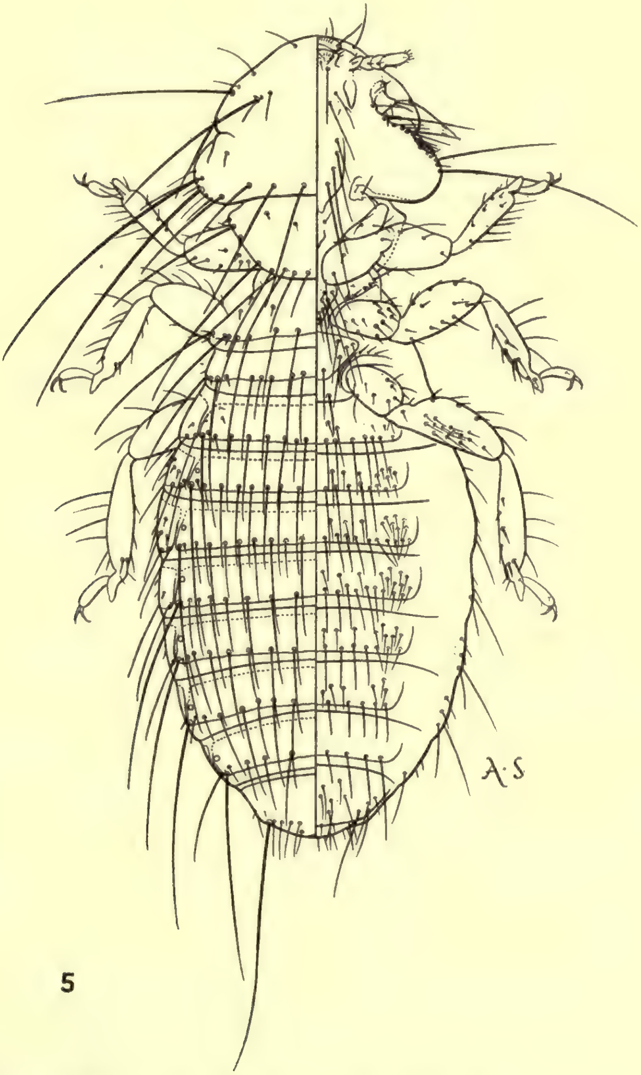

Fig. 5.—*Menacanthus alaudae* (Schrank), male.

Pediculus alaudae (p. 115, Pl. 5, figs. 5, 6)

Another obvious *Menacanthus*. Although there is no explicit host-record, Schrank calls the species " Feldlerchenlaus " and in 1781 (p. 506) he gives the host as *Alauda arvensis*.

The same species was redescribed, from the same host, by Piaget (1880 : 446) as *Menopon parviceps* (see Clay, 1949 : 904).

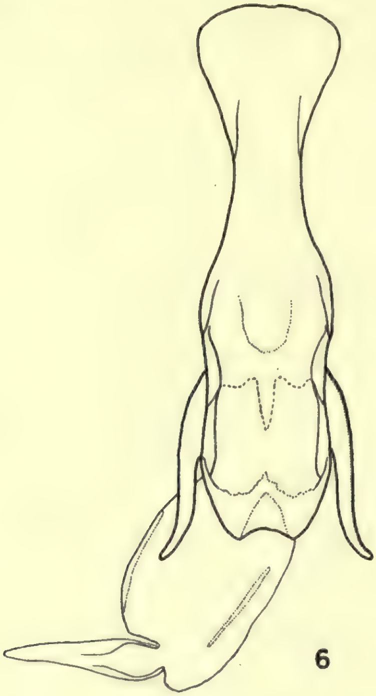

FIG. 6.—*Menacanthus alaudae* (Schrank), male genitalia.

MEASUREMENTS IN MM. :

	Male		Female	
	Length	Breadth	Length	Breadth
Head	0·25	0·39	0·27	0·43
Prothorax	0·12	0·28	0·15	0·32
Metathorax	—	0·33	—	0·40
Abdomen	0·83	0·55	1·03	0·72
Total	1·22	—	1·55	—
Genitalia	0·37	—	—	—

Neotype male (Text-figs. 5, 6) and *neallotype* female (Text-fig. 7 ; Pl. 1, fig. 3) of *Menacanthus alaudae* (Schrank) in the Meinertzhagen Collection (British Museum (Nat. Hist.)) (slide no. 3270a) from *Alauda a. arvensis* Linn. from Ushant, France.

Neoparatypes : 9 males and 33 females from various subspecies of *Alauda arvensis* from France, British Isles, Sweden and Yugoslavia.

Pediculus citrinellae (p. 116, Pl. 5, fig. 7)

The figure represents a *Philopterus*, apparently a nymph, and the host ("Ammer, Goldammer, Aimerling") is given by Schrank in 1781 (p. 507) as *Emberiza citrinella*.

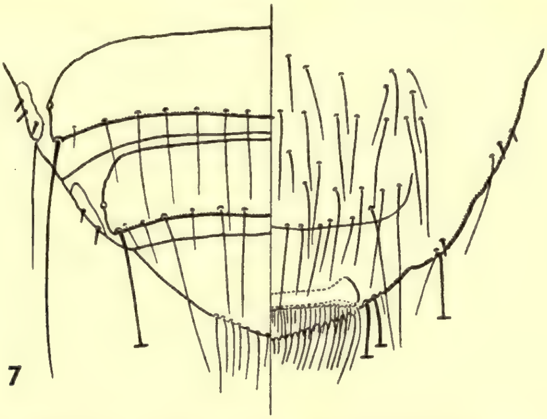

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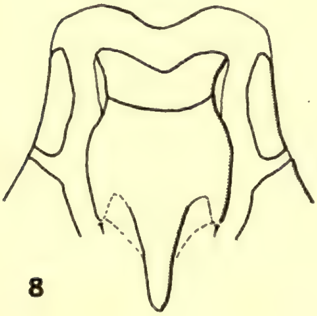
FIG. 7.—*Menacanthus alaudae* (Schrank), terminal segments of female abdomen.



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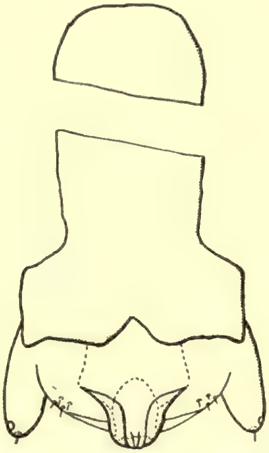

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FIGS. 8, 9.—*Philopterus c. citrinellae* (Schrank), male. 8. Anterior region of head. 9. Genitalia.

Nitzsch (1818 : 290) proposed *Philopterus* (*Docophorus*) *communis* as a *nomen novum* for *Ricinus Emberizae* De Geer, *Pediculus curvirostrae* Schrank, *Pediculus Pyrrhulae, Citrinellae* and *Chloridis* Schrank, and *Nirmus globifer* Olfers. As all these names are nomenclatorially valid, the only effect of Nitzsch's action was to create confusion in the nomenclature and to compromise hopelessly the name *communis*. *Ricinus* *emberizae* De Geer is a synonym of *Pediculus citrinellae* Schrank, and *Nirmus globifer*, though composite, is primarily a new name for the same species. As three of the names combined by Nitzsch under *communis* refer to *citrinellae*, we think it only reasonable to restrict *communis* to the *Philopterus* found on *Emberiza citrinella*; we therefore select as neotype of *Philopterus communis* Nitzsch, 1818, the neotype of *Pediculus citrinellae* Schrank, 1776. *Philopterus communis* Nitzsch thus becomes a synonym of *P. citrinellae* (Schrank), and it will only receive a bare mention under its other original components. *Ricinus emberizae* de Geer and *Nirmus globifer* Olfers, both of which are synonyms of *citrinellae*, will be dealt with in discussing the work of these authors. The identities of the insects described by Schrank as *Pediculus*

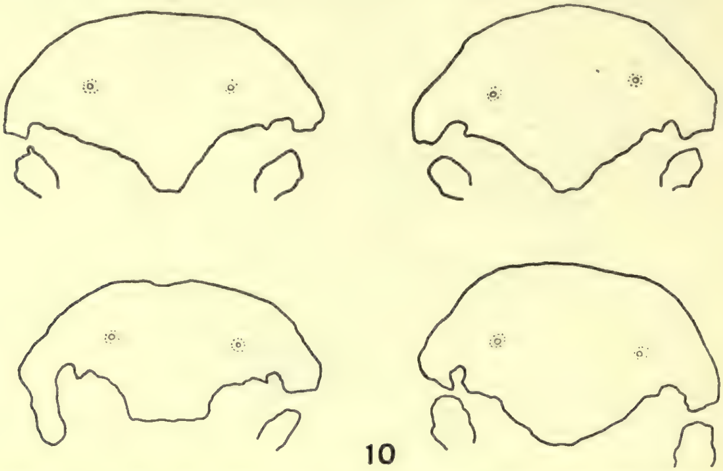

FIG. 10.—*Philopterus c. citrinellae* (Schrank), genital plates of four females taken from one host individual.

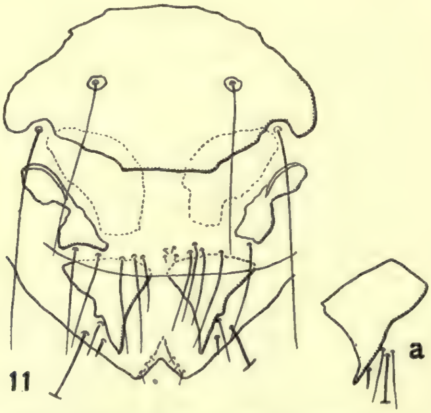

FIG. 11.—*Philopterus c. citrinellae* (Schrank), female genital region. *a.* Last sternal plate of *P. citrinellae curvirostrae* (Schrank).

citrinellae, *P. curvirostrae*, *P. pyrrhulae* and *P. chloridis* will be discussed together after our account of the last-named.

Neotype male (Pl. 10, fig. 4; Text-figs. 8, 9) and *neallotype* female (Text-figs. 10, 11) of *Philopterus citrinellae* (Schrank) in the British Museum (Nat. Hist.) (slides nos. 565–6) from *Emberiza c. citrinella* Linn. from Saxony, Germany. *Neoparatypes:* 28 males and 42 females from various subspecies of *Emberiza citrinella* from Yugoslavia, Estonia, France and the British Isles.

Pediculus curvirostrae (p. 117, Pl. 5, fig. 8)

The description and figure are those of a *Philopterus* and the host is given as *Loxia curvirostra* Linn. No early author adds anything to our knowledge of the species, but it is one of the components of *Philopterus communis* Nitzsch, 1818. Piaget in 1880 described *Docophorus compar* from the same host; his syntypes, two males and two females (slides nos. 538–9), agree with our neotypes of *curvirostrae*.

Neotype male (as described below) and *neallotype* female (Text-fig. 11*a*) of *Philopterus curvirostrae* (Schrank) in the Meinertzhagen Collection (British Museum (Nat. Hist.) (slides nos. 4112 and 4111)) from *Loxia c. curvirostra* Linn. from Poland. *Neoparatypes:* 24 males and 36 females from the same host form from Poland, Estonia and England.

Pediculus pyrrhulae (p. 117, Pl. 5, fig. 9)

The host is "Blutfink" (= *Pyrrhula pyrrhula*) and the louse is a nymph of a *Philopterus*. It is one of the components of *Philopterus communis* Nitzsch. Piaget (1880 : 58) described independently a *Docophorus communis* var. *pyrrhulae* from *Pyrrhula vulgaris* (= *Pyrrhula pyrrhula*). Piaget's type material in the British Museum (Nat. Hist.) (one male and two females, slide no. 536) agrees with the neotypes of *Philopterus pyrrhulae* (Schrank).

Neotype male and *neallotype* female (as described below) of *Philopterus pyrrhulae* (Schrank) in the Meinertzhagen Collection (British Museum (Nat. Hist.) (slide no. 1042*a*)) from *Pyrrhula pyrrhula europaea* Vieillot from France. *Neoparatypes:* 12 males and 36 females from various subspecies of *Pyrrhula pyrrhula* from France, Sweden, Estonia and the British Isles.

Pediculus chloridis (p. 118, Pl. 5, fig. 10)

Another *Philopterus* nymph, from "Grünfink," the host given by Schrank later (1781 : 506) as *Loxia chloris*; it is also another of the components of *Philopterus communis* Nitzsch.

Neotype male and *neallotype* female (as described below) of *Philopterus chloridis* (Schrank) in the Meinertzhagen Collection (British Museum (Nat. Hist.)) (slide no. 290) from *Chloris c. chloris* (Linn.) from Norfolk, England. *Neoparatypes:* 32 males and 60 females from the same host form from the British Isles and Estonia.

Philopterus citrinellae, P. curvirostrae, P. pyrrhulae and *P. chloridis*

These names were given to specimens of *Philopterus* taken respectively from *Emberiza citrinella, Loxia curvirostra, Pyrrhula pyrrhula* and *Chloris chloris* and can be considered together. While discussing their status the names will be used to refer to populations from these hosts even though in the conclusion they may be considered as indistinguishable.

The characters on which the species of *Philopterus* from the small European Passeres can be distinguished have been discussed in Part II of the present work (Clay & Hopkins, 1951). The four forms listed above parasitize the bird family Fringillidae and the possible distinguishing characters between these populations are discussed below.

HEAD. This is of the typical *Philopterus* form similar to that figured in Clay & Hopkins, 1951 : 7 for *P. coarctatus*, from which it differs in the median indentation of the hyaline margin (not always apparent in mounted specimens) and the somewhat deeper indentation of the anterior plate (clypeal signature) (Text-fig. 8). *P. fringillae* from *Passer domesticus* also has both the hyaline margin and anterior plate indented, but the pre-antennal region and the length of the anterior plate are proportionally shorter. Specimens from the four hosts under consideration show no constant differences in shape of the anterior plate nor in the proportions[1] of the head. A comparison of the size of the head (as shown by the absolute breadth at the temples, Tables 1, 2) shows that there is some variation in specimens taken from one host species, but the means fall into a number of groups. Thus, in the males *citrinellae, curvirostrae* and *chloridis* fall into one group, with *pyrrhulae* tending to be larger, but the number of specimens of the latter measured is rather small. In the females of *P. citrinellae* and *curvirostrae* the mean tends to be smaller than in those of *chloridis* and *pyrrhulae*. Further material will have to be examined before it can be shown whether or not these differences are significant.

MALE GENITALIA (Text-fig. 9). The characters show individual variation as well as differences in appearance due to the position in which the genitalia are viewed. This individual variation affects the shape of the parameres and endomeres, number and position of the setae on the mesosome and the presence (and size) or absence of the dorsal sclerotized area on the mesosome. If sufficient specimens are examined genitalia of similar appearance will be found irrespective of the host from which the specimens were taken. However, the endomeres are minute structures and their true form can probably only be reconstructed from sections, so it may prove that these structures will show subspecific variation when more thoroughly examined. On the available material there seem to be no characters in the genitalia by which the populations from the four hosts can be separated. The genitalia of *P. coarctatus* (Scopoli) (see Clay and Hopkins, 1951 : 6) and *P. fringillae* (Ibid : 32) are readily separable on the characters of the mesosome.

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[1] To find the various proportions of the head (e.g., length of preantennal region to that of the postantennal region or breadth of various parts of the preantennal region to the length of preantennal region) entails the making of a number of detailed measurements from a large number of specimens, and these measurements tend to be inaccurate owing to the difficulty of delineating the different regions of the head. However, if the image of a typical specimen from one host is projected on to a piece of paper and an outline of the head made, it is possible to project other heads on to this outline, and by adjusting the magnification to get one fixed breadth (say that of the temples) the same ; from this it is possible to compare the various proportions of the head and find the variation within a number of specimens from one host and between those from different hosts.

The diagnostic characters and the type of variation found in the female genital region have been discussed under *coarctatus* (see Clay & Hopkins, 1951 : 6). Specimens from the four hosts under discussion cannot be separated by the shape of the genital plate, although the mean of the breadth of the plates of *citrinellae* is smaller than in the other three. In general proportions the plate is similar to that of *coarctatus* and differs from that of *fringillae* as discussed under that species (see Clay & Hopkins, 1951 : 32). There is some variation in the shape of the genital plate, as shown by the four examples taken from one host individual in Text-fig. 10, and also in the size and shape of the last sternal plate.

CHAETOTAXY. There is some individual variation found throughout the different populations in the number of setae (especially in those on the abdomen), but there are three groups of setae which may show subspecific characters ; these are the setae of the metasternum, those of the male genital plate, and the group each side of the last sternal plate of the female abdomen. In *citrinellae* 80·4% of 46 males and females examined had 3 metasternal setae, 17·4% had 4, and 2·2% had 5. In *pyrrhulae* 91·2% of 34 examined had 3 metasternal setae and 8·8% had 4. In *chloridis* 84·6% of 52 specimens had 3 setae and 15·4% had 4. In *curvirostrae* 4·2% of 48 examined had 3 setae, 45·8% had 4, 45·8% had 5 and 4·2% had 6. Thus, while *curvirostrae* has 95·8% of specimens with 4 or more setae, the other three have over 80% of specimens with only three setae.

The male genital plate in *citrinellae* has two anterior and two posterior setae as in *P. coarctatus* (see Clay & Hopkins, 1951, fig. 4) ; the two anterior setae are found in 100% of specimens of *citrinellae* (29 examined), *pyrrhulae* (13 examined) and *chloridis* (26 examined). In *curvirostrae,* however, 100% of the 21 specimens examined had 3 (or rarely 4) anterior setae on the male genital plate.

Each side of the last sternite of the female abdomen there are in *citrinellae* usually 2 normal setae and one spine-like seta (Text-fig. 11). In *citrinellae* 97·2% of the 36 specimens examined had these 3 setae (rarely reduced to 2) on at least one side of the abdomen, only 2·8% had 4 setae on both sides of the abdomen. In *pyrrhulae* 95·1% of the 41 examined had 3 or less setae on at least one side, and 4·9% had 4 setae on both sides. In *chloridis* 100% of the 64 examined had 3 setae or less on at least one side. In *curvirostrae* 100% of the 32 examined had 4 or more setae on both sides (Text-fig. 11*a*). Thus, while 100% of specimens of *curvirostrae* had 4 or more setae on both sides of the abdomen, the other three had 95% or more with only 3 on at least one side.

On the evidence discussed above, populations from the four hosts obviously form a single species. The populations from *Loxia curvirostra* can be distinguished in the male in 100% of specimens (on the material examined) on one character and in 80% of specimens on a second character ; the females from this host can be distinguished in 95% of cases on one character and in 80% on a second character.

The populations from *Loxia curvirostra* can, therefore, be recognized as a subspecies. If subsequent investigations reveal subspecific differences in the other populations Schrank's names are available for these, but for the present we are unable to recognize them. The host distribution of the two subspecies we recognize is as follows:

Philopterus citrinellae citrinellae (Schrank). Type host: *Emberiza c. citrinella.* Also occurs on *Pyrrhula pyrrhula* and *Chloris chloris.*

Philopterus citrinellae curvirostrae (Schrank). Type host: *Loxia c. curvirostra.*

MEASUREMENTS IN MM. of neotypes of *P. c. citrinellae*:

	Male		Female	
	Length	Breadth	Length	Breadth
Head	0·52	0·47	0·55	0·53
Prothorax	—	0·28	—	0·30
Pterothorax	—	0·43	—	0·47
Abdomen	—	0·62	—	0·75
Total	1·46	—	2·67	—
Genitalia	0·22	—	—	—

Pediculus sturni (p. 118, Pl. 5, figs. 11–14)

A nymph of *Sturnidoecus* from "Staar" (given by Schrank in 1781 as *Sturnus vulgaris*). Schrank considered that his fig. 12 represented a different species, but it is merely a still younger nymph. Nitzsch (1818: 290) unnecessarily renamed the species *Philopterus* (*Docophorus*) *leontodon,* and it was usually known by this name until Harrison (1916: 104) restored the name given to it by Schrank.

MEASUREMENTS IN MM.:

	Male		Female	
	Length	Breadth	Length	Breadth
Head	0·52	0·53	0·55	0·57
Prothorax	—	0·30	—	0·32
Pterothorax	—	0·47	—	0·52
Abdomen	0·71	0·70	0·96	0·83
Total	1·52	—	1·80	—
Genitalia	0·35	—	—	—

Neotype male (Text-figs. 12–13; Pl. 10, fig. 5) and *neallotype* female (Text-fig. 14) of *Sturnidoecus sturni* (Schrank) in the Meinertzhagen Collection (British Museum (Nat. Hist.)), slide no. 15663, from *Sturnus v. vulgaris* Linn. from Cornwall, England. *Neoparatypes:* 138 males and 175 females from various subspecies of *Sturnus vulgaris* from the British Isles and Estonia.

O. F. MÜLLER, 1776

(*Zoologiae Danicae Prodromus.* Havniae: pp. 184–186)

This is quite the worst of the early works, but the names contained in it are binomial and must be considered. Fortunately there are only two new names in it, which both might be thought to apply to Mallophaga and also are accompanied by a description or an indication. Harrison (1916) adds a third, *Pediculus strigis*, which he considers to be a *nomen nudum*, but it is neither a *nomen nudum* nor a new name, but a reference to *strigis* Pontoppidan, *q.v.* (Clay & Hopkins, 1951, p. 29).

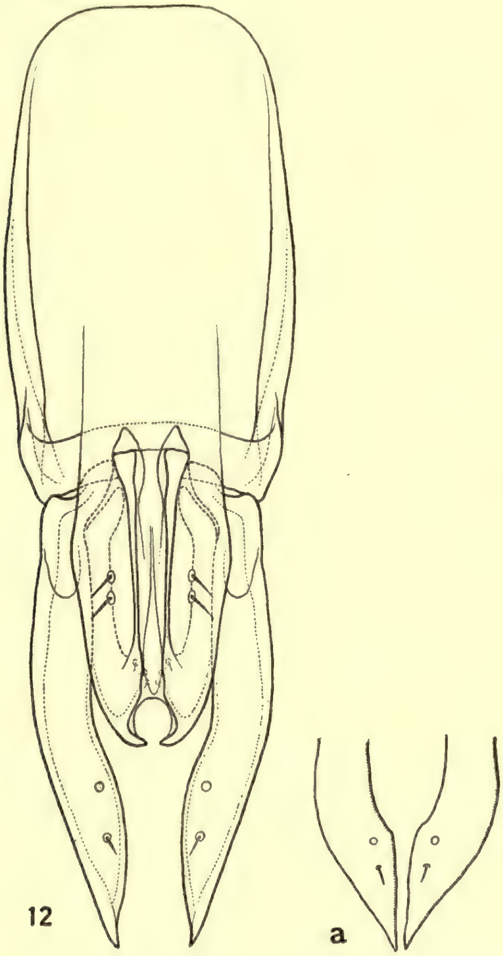


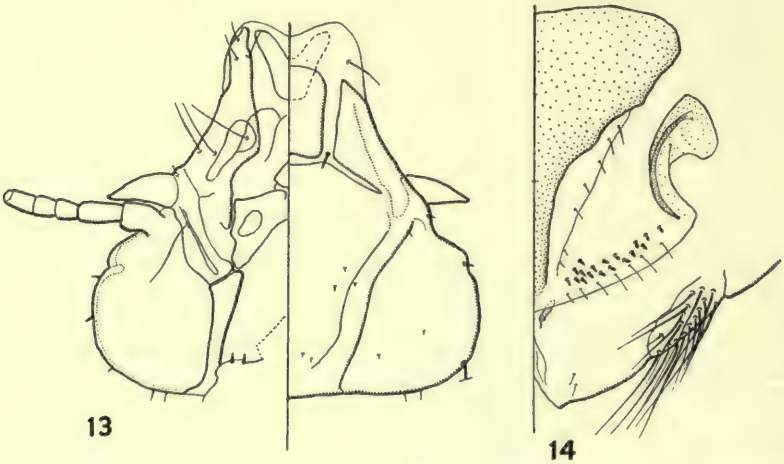
FIG. 12.—*Sturnidoccus sturni* (Schrank), male genitalia. *a*. Distal ends of parameres in natural position.

Pediculus alcae arcticae (p. 185)

The entire description is " e cinereo caerulescens," but in the case of both this and the following species there are references to " Isl.R." (= Olafsen, 1772). We have not been able to consult the original of Olafsen's work but have seen a German translation dated 1774, on p. 322 of which there are much fuller descriptions of both the species in question, under vernacular names. Olafsen's description of his "Lunda-Luus, Pediculus (Alcae arcticae)" includes a vivid account of its habits which leaves no room for doubt that it is a tick.

Pediculus colymbi grylle (p. 185)

Müller's entire description is "capite fusco, abdomine glauco," but Olafsen's fuller description of his "Hofu-Luus" states, among other points, that it is rather large, flat and oblong like *Hippobosca* (now *Melophagus*) *ovina*. This description could not be applied to any of the Mallophaga found on Alcidae, but would very well fit a tick.



Figs. 13, 14.—*Sturnidoecus sturni* (Schrank). 13. Male head. 14. Terminal segments of female abdomen, ventral.

J. C. FABRICIUS, 1777*

(*Genera insectorum eorumque characteres naturales, etc.* Chilonii, pp. 309–310)

Of the new names proposed in this work all, with one exception, are unnecessary renamings of Scopoli's species and have already been dealt with under the latter author. The descriptions are quoted from Scopoli, and the neotypes we have erected for Scopoli's species are also neotypes of Fabricius' *nomina nova*. The single exception is dealt with below.

Pediculus phasiani (p. 310)

The host-record is "Habitat in Phasiano Motmot," and besides the very brief description there is a reference to "Red.Oper.I." Redi's plate 1 shows three species, belonging to as many genera, stated to be "Pollini dell' astore." In spite of Redi's belief that all of these were hawk-parasites, the reference has enabled us to interpret Fabricius' name, for his inadequate description does not fit the upper figure on the plate and the right-hand lower figure is a *Craspedorrhynchus*, a genus which does not occur on the Galliformes. But Fabricius' description does fit the left-hand lower figure on the plate, which represents a *Chelopistes*, a genus known to occur on the Ortalidae. As we have no material from *Ortalis motmot* we are unable to erect neotypes for *Chelopistes phasiani* (J. C. Fabricius).

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* According to Engelmann, *Bibl. Hist.-Nat.*, 1846, p. 479.

DE GEER, 1778

(*Mémoires pour servir â l'histoire des insectes.* Stockholm. Vol. 7, Des Ricins, pp. 69–82)

The descriptions in this work are good and the figures for the most part excellent, but we were inclined at first to think De Geer's classification not binomial (though certainly binary) and the names invalid in consequence. This is because the generic name in each case is followed by a long descriptive phrase or diagnosis, with or without a comma after the name of the host (which always immediately follows the generic name *Ricinus* and is placed in the genitive case). We have, however, consulted Dr. Jordan on this point, and he kindly informs us that in his opinion the names are valid. He states: " The Latin diagnosis of the various species of *Ricinus* differs from the diagnoses of all other insects in vol. 7 and previous volumes in the trivial names of the species not being put into brackets, and in the case of *Ricinus* the genitive of the host-name is in italics like the Latin text of the diagnosis, not in Roman type. The work was issued after De Geer's death, and the omission of the brackets and the consequent italicizing of the trivial names was probably due to the editor. The diagnosis of species 1 of *Ricinus* should read: "*Ricinus* (Fringillae) *pallide-fuscus, corpore* . . . " We accept Dr. Jordan's opinion on this point with all the more pleasure because De Geer's work is so outstandingly better than that of his contemporaries that it would be very regrettable if technical invalidity of the names he proposed should deprive him of the credit for it.

With regard to the statement of Harrison (1916 : 10–20) that *Pediculus* Linn., *Ricinus* De Geer and *Nirmus* Hermann " must be treated as equivalent, inasmuch as each included all Mallophaga," and his action in rejecting (*e.g.*) *Ricinus fringillae* De Geer as a homonym of *Pediculus fringillae* Scopoli, the revised Rules of Zoological Nomenclature make it clear that Harrison's opinion was incorrect and that both these names may be used.

Ricinus fringillae (p. 71, Pl. 4, figs. 5–8)

The description and figures are good, and undoubtedly represent a species belonging to the genus *Ricinus s. str.* (= *Physostomum* Nitzsch). The question of the host, however, is one of some difficulty. De Geer's description in Latin is preceded by one in French, in which he calls the louse " Ricin du Pinçon " (= *Fringilla coelebs*), but he later states that he found it in March on " l'oiseau nommé Bruant " (= *Emberiza citrinella*), and that it also lives " sur les Pinçons & d'autres petits oiseaux "; the species of *Ricinus* found on *Fringilla coelebs* and on *Emberiza citrinella*, though very closely related, are not the same, and De Geer's figures resemble the latter rather than the former in the proportions of the head. Nevertheless, if there were no complications we might have taken the view that De Geer's calling the louse "Ricin du Pinçon" compelled us to apply his name to the species found on *Fringilla coelebs*, but there is a very strong reason for reluctance to adopt this attitude: Nitzsch (1818: 302) published the name *Liotheum* (*Physostomum*) *nitidissimum* as a *nomen novum* for *Ricinus fringillae* De Geer, with *Emberiza citrinella* as host, and the name *Liotheum* (*Physostomum*) *irascens* (a *nomen nudum*) with *Fringilla coelebs* as host; *irascens* was published with a description by Burmeister (1838: 442) and all later authors have used *nitidissimus* and *irascens* for the species of *Ricinus* found on *Emberiza citrinella* and *Fringilla coelebs* respectively. To select *Fringilla coelebs* as type-host of *Ricinus fringillae* De Geer would mean that the host of *nitidissimum* Nitzsch, 1818 (whose sole claim to validity is the reference to De Geer), would of necessity be the same bird and the *Ricinus* of *Emberiza citrinella* would be left without a name. We consider that this course would cause so much confusion that we must select the species from *Emberiza citrinella* to bear the name that De Geer gave to the composite of both species. De Geer's species is also a component of *Nirmus pterocephalus* Olfers, 1816, but we consider this latter composite name to refer mainly to *Ricinus rubeculae* (Schrank).

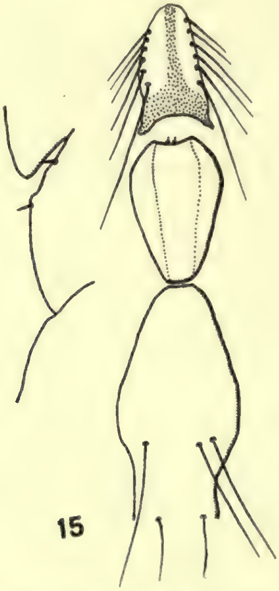

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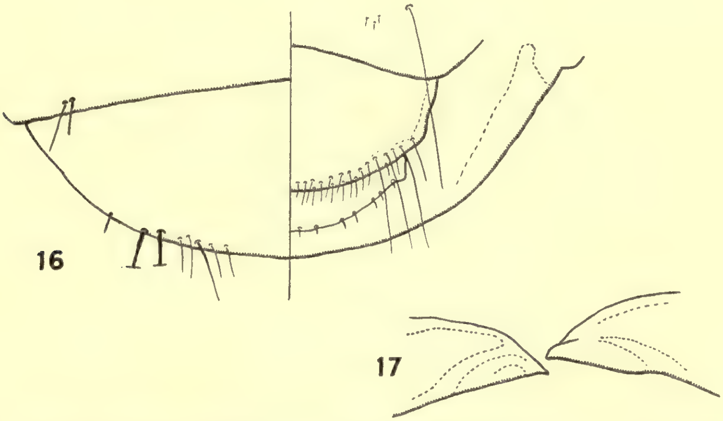
FIG. 15.—*Ricinus fringillae* De Geer, Gular and thoracic plates, female.

The characters by which *R. fringillae* can be distinguished from *rubeculae* are given above under that species. This species is separated from others occurring on the Fringillidae by the shape of the head and prothorax (Pl. 10, fig. 6) and by the prothoracic plate (fig. 15), and from some species by the characters of the mandibles (fig. 17).

MEASUREMENTS IN MM. :

	Female	
	Length	Breadth
Head . . .	0·70	0·68
Prothorax . .	—	0·52
Abdomen . .	—	1·07
Total . . .	3·46	—

Neotype female (Text-figs. 15–17 ; Pl. 10, fig. 6) of *Ricinus fringillae* De Geer in the British Museum (Nat. Hist.) (slide no. 563) from *Emberiza c. citrinella* Linn, from Saxony, Germany. *Neoparatypes:* 4 females from the same host species from England, Estonia and Czechoslovakia.



FIGS. 16, 17.—*Ricinus fringillae* De Geer, female. 16. Terminal segments of abdomen. 17. Tips of mandibles.

Ricinus emberizae (p. 74, pl. 4, figs. 9, 10)

The host is " Bruant," *Emberiza* or "Grŏning " (= *Emberiza citrinella*), and the description and figure are those of a *Philopterus*. We consider this to be a synonym of *Philopterus c. citrinellae* (Schrank). Doubtless De Geer was misled into thinking it new by the fact that Schrank's species was described from a nymph.

Neotype of *Philopterus emberizae* (De Geer) a male in the British Museum (Nat. Hist.) collection (slide no. 564) from *Emberiza c. citrinella* Linn. from Yugoslavia, which agrees with the neotype of *Philopterus c. citrinellae* (Schrank).

Ricinus cornicis (p. 76, Pl. 4, fig. 11)

De Geer places " *Pediculus Corvi Coracis* Linn." as a synonym, but the species has nothing to do with *Philopterus corvi* (Linn.), both figure and description very clearly referring to a *Myrsidea*. The host-record is " Corneille " (= *Corvus corone cornix*).

Nitzsch (1818 : 300) renamed the species *Liotheum* (*Menopon*) *mesoleucum*, quoting

De Geer and giving the host-record "Corvi Cornicis." Harrison (1916 : 13) erroneously considered *Ricinus cornicis* De Geer (a *Myrsidea*) to be preoccupied by *Pediculus cornicis* J. C. Fabricius (a *Philopterus*); he also took the erroneous view that *mesoleucum* Nitzsch, 1818, is a *nomen nudum*, and in consequence the species has commonly been known as *Myrsidea subaequalis* (Haan*). The neotypes we erect for *Myrsidea cornicis* (De Geer) are necessarily also neotypes of *M. mesoleuca* (Nitzsch).

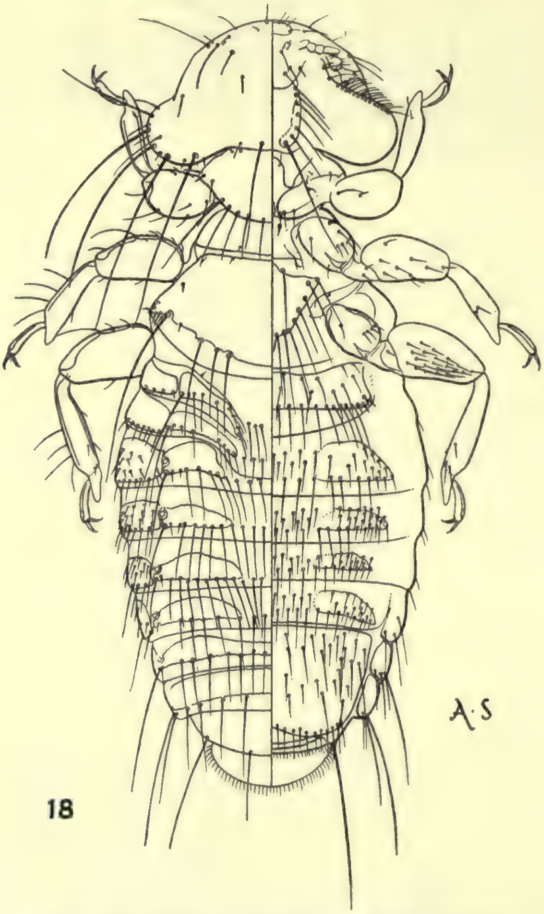


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Fig. 18.—*Myrsidea cornicis* (De Geer), female.

This species can be distinguished from other *Myrsidea* occurring on the European species of *Corvus* by the greater modification of tergites I–II (Text-fig. 18) in the female and by the sclerite of the genital sac in the male (Text-fig. 20). The chaetotaxy of sternite II (Text-fig. 22) in both sexes resembles most closely that of the species on *Corvus monedula*, but *cornicis* can be distinguished by the shape of the head in the male (Pl. 11, fig. 1) and by the characters given above.

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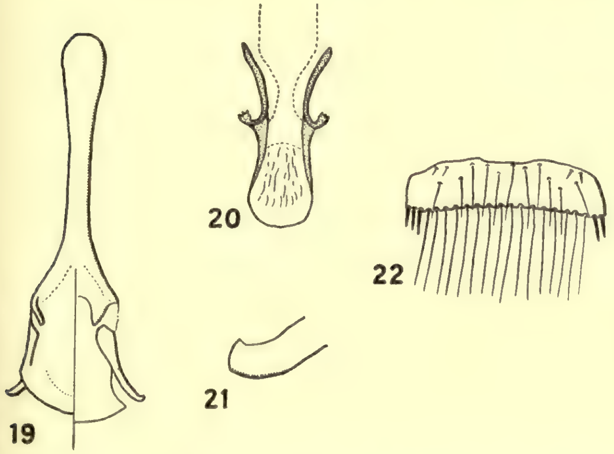
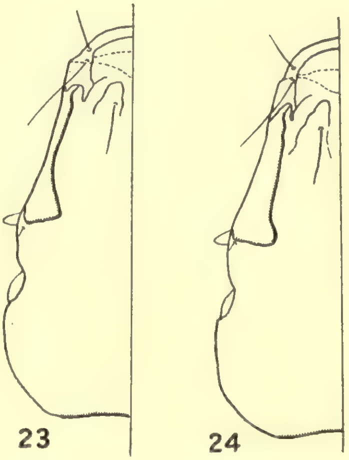
* The authorship of the name is often incorrectly ascribed to Nitzsch or to Lyonet.

MEASUREMENTS IN MM. :

	Male		Female	
	Length	Breadth	Length	Breadth
Head	0·33	0·60	0·35	0·65
Prothorax	—	0·40	—	0·41
Metathorax	—	0·54	—	0·68
Abdomen	—	0·67	—	0·87
Total	1·89	—	2·14	—
Genitalia	0·66	—	—	—

Neotype female (Text-fig. 18) and *neallotype* male (Text-figs. 19–22, Pl. 10, fig. 1) of *Myrsidea cornicis* (De Geer) in the Meinertzhagen Collection (British Museum (Nat. Hist.)) (slide no. 16012a) from *Corvus corone cornix* Linn. from Sweden. *Neoparatypes :* 174 males and 143 females from the same host form from Sweden, Estonia, E. Prussia, Hungary, Yugoslavia and the British Isles.





FIGS. 19–22.—*Myrsidea cornicis* (De Geer), male. 19. Male genitalia. 20. Sclerite of genital sac. 21. Tip of paramere enlarged. 22. Second abdominal sternite.

FIGS. 23, 24.—Male heads, dorsal. 23. *Anaticola crassicornis* (Scopoli). 24. *A. mergiserrati* (De Geer).

Ricinus lari (p. 77, Pl. 4, fig. 12)

There are references to " *Pediculus Sternae Hirundinis* Linn." and " Redi Experim. Tab. 9," though neither of these species is even congeneric with that described by De Geer, both his figure and his description being quite certainly those of a *Trinoton*. The host-record "sur les Mouettes" (= *Larus* spp.) is definitely erroneous, for neither *Trinoton* nor any genus closely resembling it occurs naturally on the Laridae.[1]

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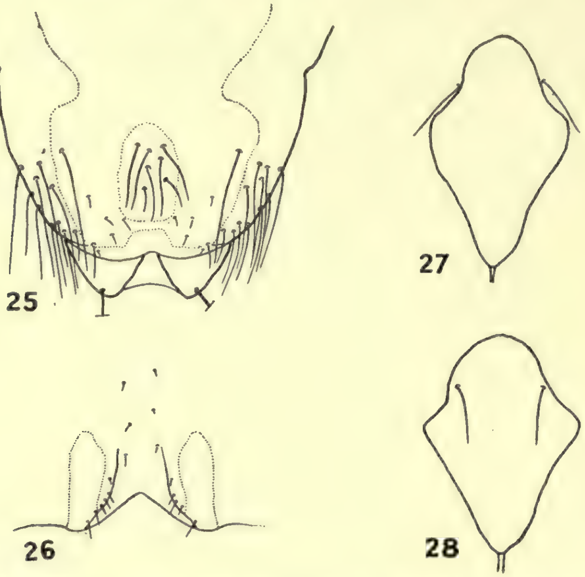
[1] We considered the large type of *Actornithophilus* occuring on the Laridae, but the figure does not agree with this.

J. C. Fabricius (1781 : 481) erroneously placed De Geer's name as a synonym of *Pediculus sternae* Linn., doubtless misled by De Geer's reference to this species. Nitzsch (1818 : 300) considered De Geer's species to be probably the same as his *Liotheum* (*Trinoton*) *lituratum* (a *nomen nudum* in 1818), from *Mergus albellus*, probably because another of De Geer's species is from *Mergus serratus*.

We see no reason whatever to adopt Nitzsch's belief, De Geer's figure not being sufficiently detailed to refer to one species of *Trinoton* rather than another, and the common-sense procedure with regard to a species described from a straggler is obviously to make it a synonym of some earlier name if possible. Fortunately *Trinoton querquedulae* (Linn.) is a much earlier valid name and there is nothing in De Geer's figure and description to suggest that this was not the species he had.



FIGS. 25–28.—25. *Anaticola c. mergiserrati* (De Geer), terminal segments of male abdomen, ventral. 26. Female vulva. 27. *A. crassicornis* (Scopoli), female meso-metasternal plate. 28. *A. c. mergiserrati*, female meso-metasternal plate.

We accordingly designate as male neotype of *Trinoton lari* (De Geer) a specimen in the Meinertzhagen Collection (British Museum (Nat. Hist.)) (slide no. 8018) from *Anas. c. crecca* (Linn.) from Nepal, which agrees with Text-figs. 26–28 and Pl. 2, fig. 2 (in Clay & Hopkins, 1950) of *Trinoton querquedulae* ((Linn.).

Ricinus mergi serrati (p. 78, Pl. 4, fig. 13)

The description and figure are unquestionably those of an *Anaticola* and the host is carefully given as " le Plongeon nommé *Mergus serratus Linn. Faun. Ed.* 2 *no.* 136 " (an important point, because " plongeon " normally means a member of the Gaviidae, or divers).

The species was renamed *Pediculus mergi* by J. C. Fabricius (1781 : 480) and *Philopterus* (*Lipeurus*) *temporalis* by Nitzsch (1818 : 292) ; both names are mere *nomina nova* for De Geer's species and our neotypes of *mergiserrati* must also be neotypes of *mergi* and *temporalis*. De Geer's figure seems to represent a nymph but is not so good as most of his figures. *Ricinus mergiserrati* De Geer passed under Nitzsch's name until 1916, when Harrison (p. 138) mentioned it as *Esthiopterum mergiserrati* De Geer and correctly placed *mergi* Fabricius and *temporalis* Nitzsch as synonyms.

De Geer carefully separates, but does not name, another "Ricin" from the mesa host, drawn as fig. 14 of his plate 4. This is undoubtedly an *Anatoecus*, and will be dealt with under *Philopterus icterodes* Nitzsch, 1818.

All the specimens of *Anaticola* from the Anseriformes examined are very similar, having male genitalia differing only in proportions and the female genital region in the chaetotaxy ; all have the bilobed spermatheca in the female. Distinguishing characters are found in the proportions of the head, meso-metasternal plate and male genitalia, and in the chaetotaxy of the prothorax and male and female genital regions. *A. mergiserrati* (which should probably be considered as a subspecies of *A. anseris* (Linn.) or certainly of *A. crassicornis* (Scopoli)) is distinguished from *anseris* by the proportions of the head and male genitalia, by the characters of the preantennal region of the head, and by the presence of only one dorsal submarginal prothoracic seta each side. Both *crassicornis* and *mergiserrati* tend to have a greater number of setae on the genital region of the male (Text-fig. 25) and on the vulva of the female (Text-fig. 26) than *anseris*—too few specimens of this latter species are available for a more exact comparison. *A. mergiserrati* is distinguished from *crassicornis* with certainty only by the broader marginal carinae of the head (Text-figs. 23–24) and the longer penis. The meso-metasternal plate (Text-figs. 27, 28) is shorter and broader in *mergiserrati*.

MEASUREMENTS IN MM. :

	Male		Female	
	Length	Breadth	Length	Breadth
Head	0·67	0·43	0·72	0·47
Prothorax	—	0·32	—	0·35
Pterothorax	—	0·41	—	0·47
Abdomen	1·50	0·49	2·00	0·57
Total	2·70	—	3·20	—
Genitalia	0·65	—	—	—

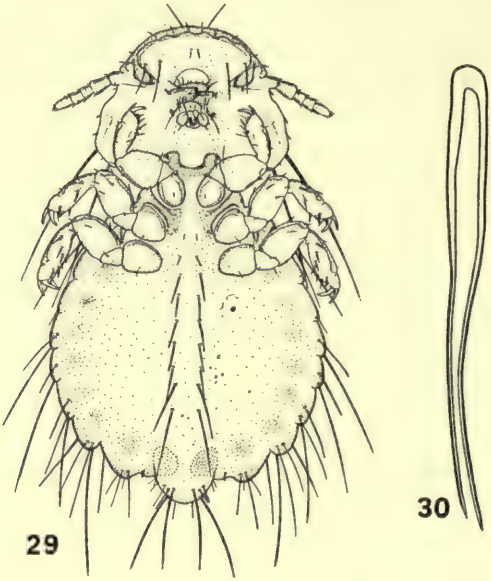
LENGTH OF PENIS IN MM. (number of specimens in brackets): 0·20 (1), 0·22 (6), 0·23 (3).

Neotype male (Text-figs. 24, 25 ; Pl. 11, fig. 2) and *neallotype* female (Text-figs. 26, 28 ; Pl. 11, fig. 3) of *Anaticola crassicornis mergiserrati* (De Geer) in the Meinertzhagen collection (British Museum (Nat. Hist.)) (slide no. 19298a) from *Mergus serrator* Linn. from North Uist, Scotland. *Neoparatypes :* 46 males and 28 females from the same host species from the British Isles.

Ricinus gallinae (p. 79, Pl. 4, fig. 15)

The host is " Poule " (= *Gallus domesticus*) and the description and figure represent a *Goniocotes*. The name is not preoccupied by *Pediculus gallinae* Linn., which is a *Menopon*.

Nitzsch (1818 : 294) renamed the species *Philopterus* (*Goniodes*) *hologaster*. Burmeister (1828 : 431) placed it in his new subgenus *Goniocotes*, of which it was subsequently selected as type species.



FIGS. 29, 30.—*Goniocotes gallinae* (De Geer). 29. Male. 30. Male genitalia.

MEASUREMENTS IN MM. :

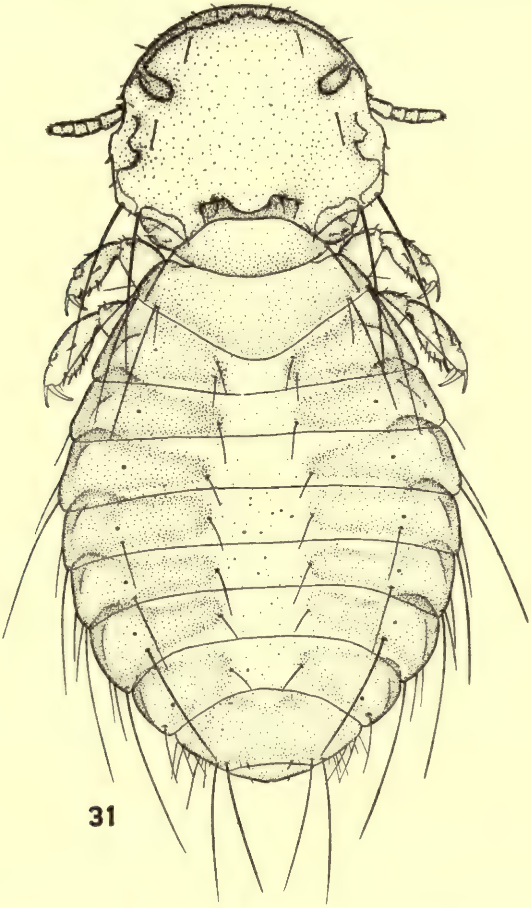
	Male		Female	
	Length	Breadth	Length	Breadth
Head	0·28	0·37	0·40	0·51
Prothorax	—	0·22	—	0·31
Pterothorax	—	0·34	—	0·46
Abdomen	0·50	0·51	0·90	0·80
Total	0·90	—	1·44	—
Genitalia	0·42	—	—	—

Neotype male (Text-figs. 29, 30) and *neallotype* female (Text-figs. 31, 32) of *Goniocotes gallinae* (De Geer) in the British Museum (Nat. Hist.) Collection (slides nos. 567–8) from *Gallus domesticus* from Scotland. *Neoparatypes :* 4 males and 25 females from the same host species from the British Isles.

Ricinus canis (p. 81, Pl. 4, fig. 16)

The host is " chien " (= *Canis familiaris*), and the description and not very good figure unquestionably represent the species of *Trichodectes* commonly found on this host.

O. Fabricius (1780 : 215) gives a completely independent description of a *Pediculus canis*, from *Canis familiaris*, which has given much trouble because the description is so bad. Nitzsch (1818 : 296) gave a doubtful reference to *canis* Fabricius under his *Trichodectes subrostratus* (a *nomen nudum* in 1818), Harrison ignored it, and other authors who mention it mostly accept Nitzsch's suggestion that it was *subrostratus*. It must receive serious consideration because, as it is not a primary homonym of *Ricinus canis* De Geer, it could be the earliest valid name for *Felicola subrostratus* (Burmeister).



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FIGS. 31.—*Goniocotes gallinae* (De Geer), female.

Turning to the original description of Fabricius, we find that numerous structural characters exclude any dog-parasites except Mallophaga and it is stated to occur in large numbers, excluding any likelihood that it was not a true dog-parasite. We fully agree with Kéler (1938 : 422) that with one exception (the mention of a " rostrum subcylindricum ") the characters agree excellently with the *Trichodectes* of the dog, this former character being certainly what led Nitzsch to suggest that it might be *subrostratus* (found on the domestic cat). But we again find ourselves in full agreement with Kéler that the other characters exclude the cat-louse, and that the " rostrum subcylindricum " must have been a portion of a hair gripped between the mandibles. Accordingly we shall select a neotype for *Trichodectes canis* (O. Fabricius) in such a way as to make it a synonym of *T. canis* (De Geer), of which it is also a secondary homonym. *Trichodectes latus* Nitzsch (1818 : 296) is a *nomen novum* for De Geer's species and therefore an absolute synonym, based on the same types.

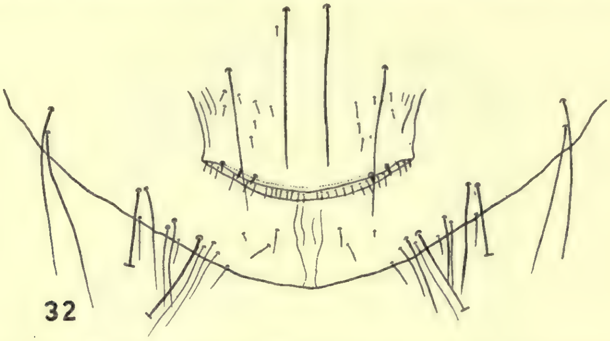


FIG. 32.—*Goniocotes gallinae* (De Geer), terminal segments of female abdomen, ventral.

Neotype male and *neallotype* female of *Trichodectes canis* (De Geer), which agree with the description and figures published by Werneck under the same name (Werneck, 1936 : 502–6, figs. 130–135), in the British Museum (Nat. Hist.) (slide nos. 581–2) from *Canis familiaris* from São Paulo, Brazil. *Neoparatypes :* 32 males and 31 females from the same host species from Brazil, British Isles and Germany.

O. FABRICIUS, 1780

(*Fauna Groenlandica*, Hafniae & Lipsiae, pp. 215–220)

Most of the descriptions in this work are new and independent, but there are a few redescriptions. The descriptions are poor and there are no figures, but the names are in unquestionably valid form.

There is some confusion regarding the correct interpretation of the hosts from which Fabricius collected his specimens, and we are greatly indebted to Dr. Finn Salomonsen for assistance in identifying these correctly.

Pediculus canis (p. 215)

This species has been fully discussed under *Ricinus canis* De Geer, of which it is a synonym.

Neotype male of *Trichodectes canis* (Fabricius) in the British Museum (Nat. Hist.) (slide no. 583) from *Canis familiaris* from São Paulo, Brazil. This specimen agrees with the neotype of *Trichodectes canis* (De Geer).

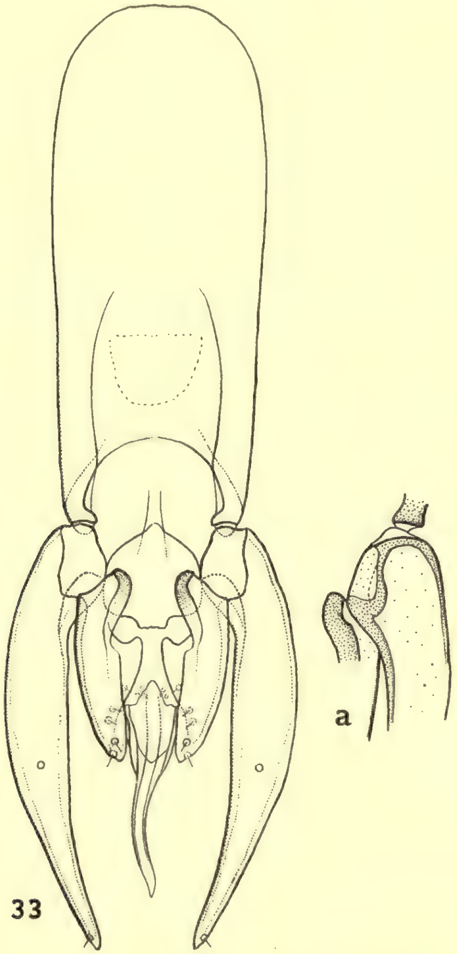


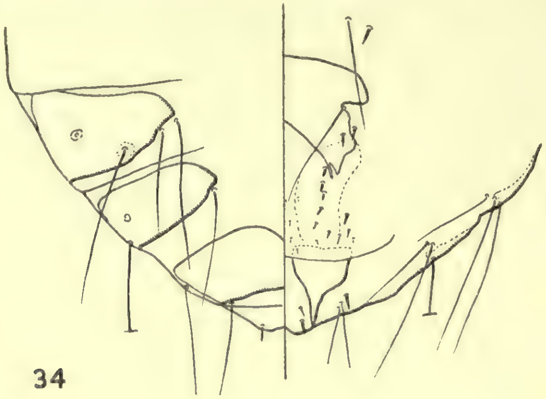
FIG. 33.—*Saemundssonia grylle* (O. Fabricius), male genitalia. *a*. Head of paramere.

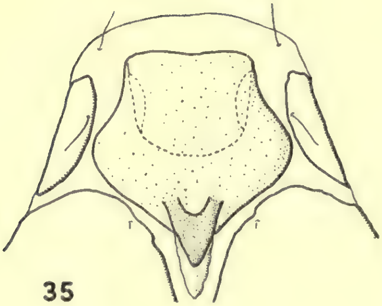
Pediculus strigis (p. 216)

Fabricius thought his species, taken from *Strix nyctea* (= *Nyctea scandiaca*), was the same as *P. strigis* Müller, which we have already discussed as *P. strigis* Pontoppidan. It is unlikely that this is the case, but as the name is a primary homonym we do not propose to discuss it further.

Pediculus corvi (p. 217)

This name is attributed to *Syst.Nat.* (i.e., Linné), and there is no need to discuss it except to note that as the description is that of a *Philopterus* and the host is *Corvus corax* it could be regarded as a restriction of Linné's name to the species found on the raven. We have already restricted *Philopterus corvi* (Linn.) in the same sense.





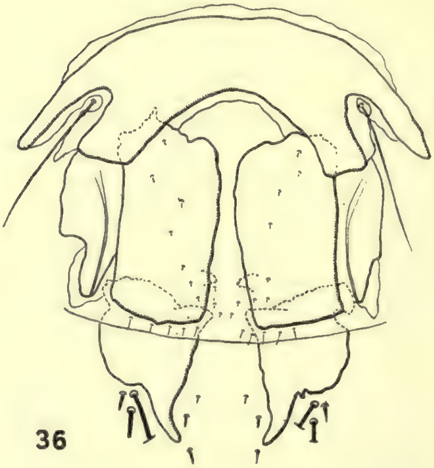


FIG. 34.—*Saemundssonia grylle* (O. Fabricius), terminal segments of female abdomen.
FIGS. 35, 36.—*Saemundssonia lari* (O. Fabricius). 35. Anterior region of male head, dorsal. 36. Genital region of female.

Pediculus clangulae (p. 217)

Fabricius gave the host of this species as *Anas clangula*, but (as confirmed by Dr. Salomonsen) the species which Fabricius had must have been *Bucephala islandica* (Gmelin). In addition to the description there is a queried reference to *Pediculus querquedulae* Linn. It was doubtless this reference which led Harrison (1916 : 12) to refer *clangulae* to *Trinoton*, but the description cannot possibly apply to *Trinoton* or to any other duck-parasite except an *Anaticola*, which it fits very well. The species appears never to have been renamed or redescribed.

As we have no specimens of *Anaticola* from *Bucephala islandica* (Gmelin) we are unable to erect neotypes for *Anaticola clangulae* (O. Fabricius).

Pediculus grylle (p. 218)

Although this purports to be a renaming of *P. colymbi grylle* Müller (a tick), the brief independent description " Pediculus niger, fasciis albis, abdomine ovato " cannot apply to a tick, none of which are banded, but does apply fairly well to the *Saemundssonia*, which occurs on *Cepphus grylle*, and not at all to any other known parasite of this bird.

Denny (1842 : 44, 86, Pl. 5, fig. 6) redescribed the species as *Docophorus megacephalus* from a teneral specimen obtained from the same host,[1] and the species was known under this name until Harrison (1916 : 12, 14) restored the name given to it by Fabricius.

Specimens examined : 28 males and 38 females from *Cepphus g. grylle* (Linn.) from the British Isles. As we have no material of *Saemundssonia* from *Cepphus g. arctica* Brehm.), the subspecies from which Fabricius took his specimens, we are unable to erect neotypes of *Saemundssonia grylle* (O. Fabricius). We have, however, included figures (Text-figs. 33, 34 ; Pl. 11, fig. 4) of what is almost certainly this form drawn from specimens taken from *Cepphus g. grylle* (Linn.). It should be noted that there is individual variation in the shape of the female genital plate and chaetotaxy of the genital region.

MEASUREMENTS IN MM. :

	Male		Female	
	Length	Breadth	Length	Breadth
Head	0·52	0·45	0·55	0·52
Prothorax	—	0·28	—	0·32
Pterothorax	—	0·36	—	0·40
Abdomen	0·62	0·59	0·67	0·65
Total	1·28	—	1·42	—
Genitalia	0·46	—	—	—

Neotype of *Docophorus megacephalus* Denny, a male (Text-figs. 33, 34 ; Pl. 11, fig. 4), in the Meinertzhagen Collection (British Museum (Nat. Hist.)), (slide no. 16698), from *Cephus g. grylle* (Linn.) from N. Uist, Outer Hebrides.

Pediculus bassani (p. 218)

Thompson (1940 : 372–381) has dealt fully with the identity and synonymy of *Pectinopygus bassani* (O. Fabricius) and has erected neotypes for it (p. 380).

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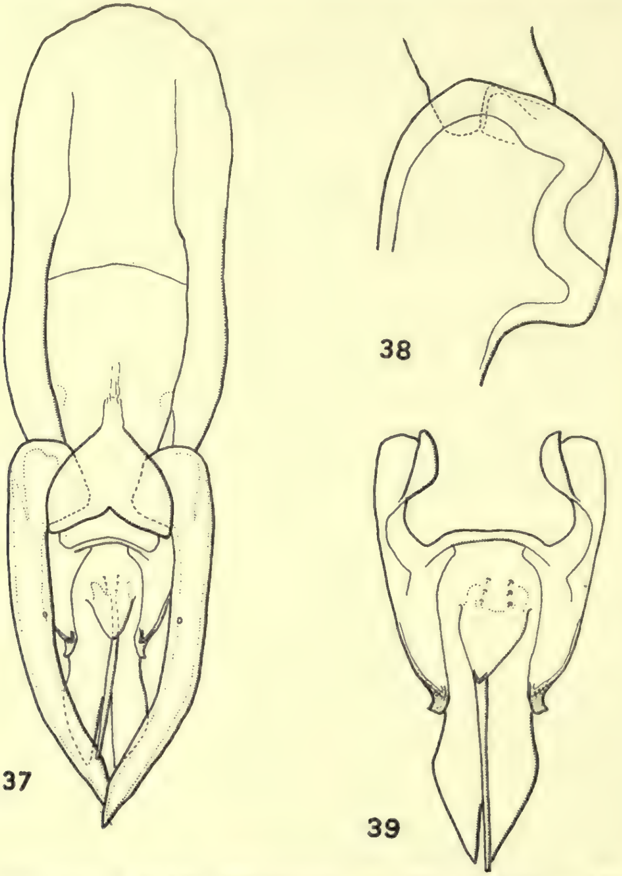
[1] Denny's type material of this species is not in the Brit. Mus. (N.H.) collection.

Pediculus lari (p. 219)

Harrison (1916 : 16) considered this name to be preoccupied by *lari* De Geer, but the latter was published in *Ricinus* and is now in *Trinoton*, so *lari* O. Fabricius, which is a *Saemundssonia*, is valid. The description is much better than the rest and mentions a triangular head, acuminate in front and with a bifid rostrum, that the insect is wholly black except for white blotches above and below, besides other details which make it perfectly clear that Fabricius had before him a female *Saemundssonia*. The original host-record is " Habitat in laro glauco et quidem macro " ; *Larus glaucus* is a synonym of *L. hyperboreus* Gunnerus. The species was redescribed as *S. lariphaga* by Timmermann (1949 : 8). *Docophorus lari* Denny, 1842 ; *D. lari* Grube, 1851 ; *D. lari* T. Müller, 1927 and *Pediculus lari* Larrañaga, 1928, are all referable to *Saemundssonia* and are, therefore, homonyms of *S. lari* (Fabricius).



FIGS. 37–39.—*Saemundssonia lari* (O. Fabricius). 37. Male genitalia. 38. Head of paramere enlarged. 39. Mesosome enlarged (from another specimen).

S. lari (O. Fabricius) is the earliest name for any species of *Saemundssonia* from the genus *Larus*, and, as shown by Timmermann (1951), the *Saemundssonia* from nearly all the species of this genus must be considered as subspecies of *lari*.

In *S. l. lari* the tergal plates of abdominal segment II are joined medianly in both sexes and the dorsal abdominal setae of the female do not form a continuous line across the segment, occurring only along the posterior margins of the tergal plates. In the male genitalia there is no sclerotized cross-bar at the distal end of the basal plate (Text-fig. 37) and the endomeral projections are fused medianly.

MEASUREMENTS IN MM.:

	Male		Female	
	Length	Breadth	Length	Breadth
Head	0·60	0·62	0·62	0·68
Prothorax	—	0·34	—	0·37
Pterothorax	—	0·48	—	0·53
Abdomen	0·90	0·85	1·16	0·98
Total	1·76	—	2·06	—
Genitalia	0·68	—	—	—

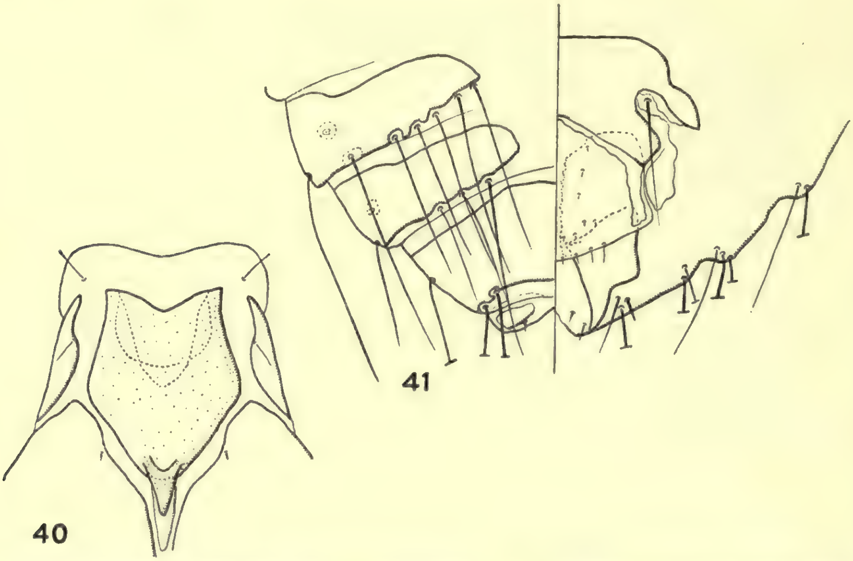
Neotype male (Text-figs. 35, 37–39, Pl. 11, fig. 5) and *neallotype* female (Text-fig. 36) of *Saemundssonia lari lari* (O. Fabricius) in the British Museum (Nat. Hist.) Collection (slide no. 569) from *Larus hyperboreus* Gunnerus from Iceland. *Neoparatypes:* 51 males and 48 females from the same host species from Iceland, Jan Mayen Is. and the British Isles.

Pediculus tringae (p. 219)

This species is stated to occur on *Tringa striata*, which at once presents us with a difficulty, because this name has been applied to the redshank and also (incorrectly) to the purple sandpiper; but the former does not occur in Greenland, so the host of *P. tringae* must have been *Erolia maritima*. The insect is described as white with a red dot on the abdomen (obviously ingested blood) and a suborbicular body, the size is that of the head of a pin, the antennae are like very minute hairs, the thorax is oval and the abdomen almost circular. Obviously the specimen was a very young nymph. Harrison regards the species as unrecognizable and we have much sympathy with this view, but it is one only to be adopted in the last resort. The mention of an almost orbicular abdomen at once rules out any genera found regularly on the Charadriiformes except *Saemundssonia*, *Austromenopon* and perhaps *Actornithophilus*, but not only are nymphs of the two latter genera brownish-yellow rather than white, but also their antennae are concealed and the palps (sometimes mistaken for antennae) far from conspicuous, so that Fabricius' insect must have been a *Saemundssonia*; only one *Saemundssonia* appears to occur normally on *Erolia maritima*.

Through the kindness of Dr. René Malaise it has been possible to remount and examine the syntypes of *Docophorus arcticus* Mjöberg (1910 : 122) said to have been taken from "*Tringa* sp. (*maritima* ?)." The syntypes, which comprise one male and two females, are conspecific with the neotypes of *S. tringa* from *Erolia maritima*; *S. arctica* can, therefore, be considered as a synonym of *tringae* (Fabricius).

This species is distinguished from other *Saemundssonia* on the Charadrii by the size and shape of the head (Pl. 11, fig. 6) and anterior plate (clypeal signature) (Text-fig. 40) and by the male genitalia (Text-figs. 42–44). The tergal plates of abdominal segment II are joined medianly in both sexes and the dorsal abdominal setae do not form a continuous line across each segment, occurring only along the posterior margins of the tergal plates. In the male genitalia there is a sclerotized cross-bar at the distal end of the basal plate and the endomeral projections are fused medianly (Text-fig. 42).



FIGS. 40, 41.—*Saemundssonia tringae* (O. Fabricius). 40. Anterior region of male head, dorsal. 41. Terminal segments of female abdomen.

MEASUREMENTS IN MM. :

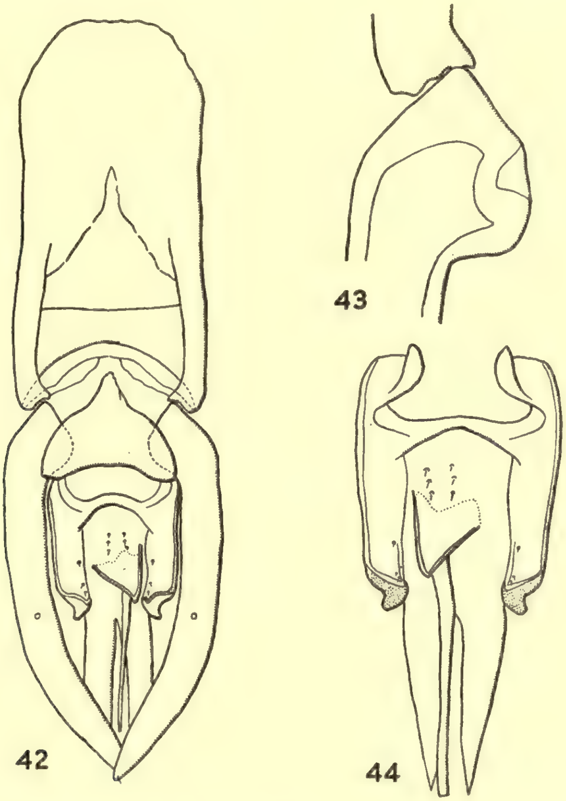
	Male		Female	
	Length	Breadth	Length	Breadth
Head	0·55	0·51	0·62	0·59
Prothorax	—	0·28	—	0·33
Pterothorax	—	0·38	—	0·47
Abdomen	0·75	0·65	0·97	0·83
Total	1·47	—	1·67	—
Genitalia	0·43	—	—	—

Neotype male (Text-figs. 40, 42–44, Pl. 11, fig. 6) and *neallotype* female (Text-fig. 41) of *Saemundssonia tringae* (O. Fabricius) in the Meinertzhagen Collection (British Museum (Nat. Hist.)), slide no. 2346, from *Erolia maritima* (Brünnich) from Scotland. *Neoparatypes :* 16 males and 16 females from the same host species from the British Isles, Spitzbergen and Finland.

Lectotype of *Saemundssonia arctica* (Mjöberg) : ♂ in the Naturhistoriska Riksmuseum, Stockholm, from "*Tringa* sp. (*maritima?*) from Lilla Pendulum-Ön" (6.vii.1899).

Pediculus hiaticulae (p. 220)

The host is *Charadrius hiaticula*, and the only points of much value in the description are that the head is triangular, the oblong body sublinear and the whole insect mouse-coloured, but this description is sufficient to give us the genus at once, for the only genus occurring on the genus *Charadrius* in which the body could possibly be described as sublinear is *Quadraceps*. Two species of this genus occur on *Charadrius hiaticula*, and both are fairly common ; *Quadraceps fissus* (Burmeister) is a relatively stout species, while the other is very slender. This latter species was discussed at some length by Waterston (1915 : 35) without his being able to find a satisfactory name for it, but Hopkins (1942 : 115) expressed the opinion that the slender species is *Quadraceps hiaticulae* (O. Fabricius). As Fabricius describes his species as sublinear we think there can be no question that this is the species he had before him,

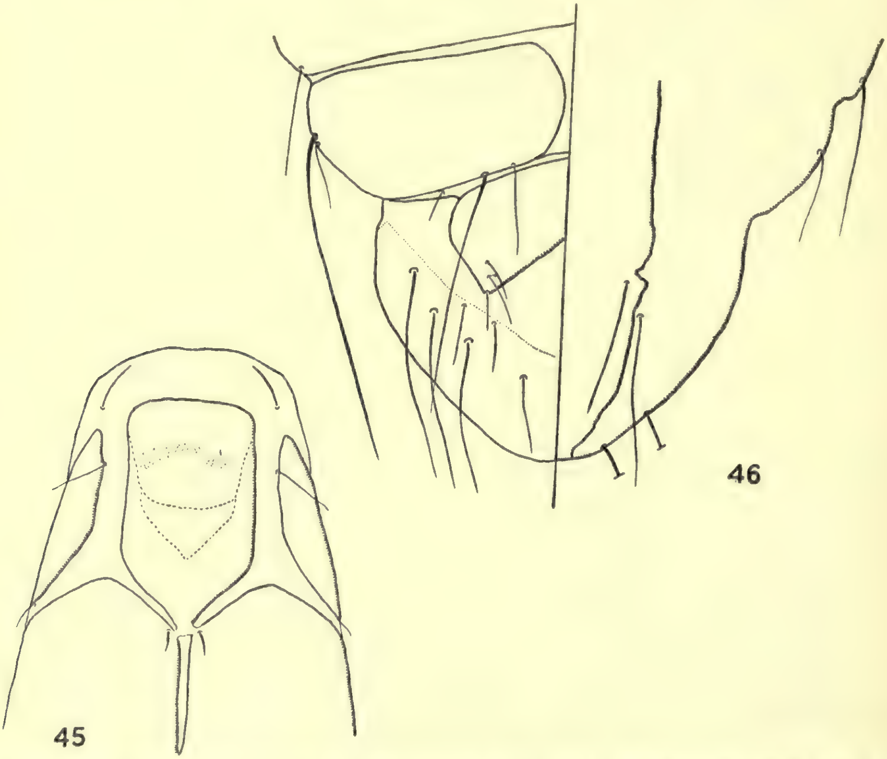


FIGS. 42–44.—*Saemundssonia tringae* (O. Fabricius). 42. Male genitalia. 43. Head of paramere. 44. Mesosome enlarged (from another specimen).

and we reject Harrison's placing of *fissus* Burmeister as a synonym (Harrison : 1916 : 15, 113). Harrison ascribes the authorship to Müller, but the latter only mentioned *Pediculus hiaticulae* as a *nomen nudum*, so the author is Fabricius.

Measurements in mm. :

	Male		Female	
	Length	Breadth	Length	Breadth
Head	0·42	0·23	0·42	0·23
Prothorax	—	0·17	—	0·18
Pterothorax	—	0·25	—	0·24
Abdomen	1·16	0·31	1·26	0·30
Total	1·83	—	1·90	—
Genitalia	0·36	—	—	—



Figs. 45, 46.—*Quadraceps hiaticulae* (O. Fabricius), male. 45. Anterior region of head, dorsal. 46. Terminal segments of abdomen.

Neotype male (Text-figs. 45–50; Pl. 12, fig. 1) and *neallotype* female (Text-fig. 51, Pl. 12 fig. 2) of *Quadraceps hiaticulae* (O. Fabricius) in the Meinertzhagen Collection (British Museum (Nat. Hist.)), slide no. 10514, from *Charadrius h. hiaticula* Linn. from Ireland. *Neoparatypes :* 116 males and 159 females from the same host form from the British Isles and 17 males and 9 females from *Charadrius h. tundrae* (Lowe) from the Sudan.

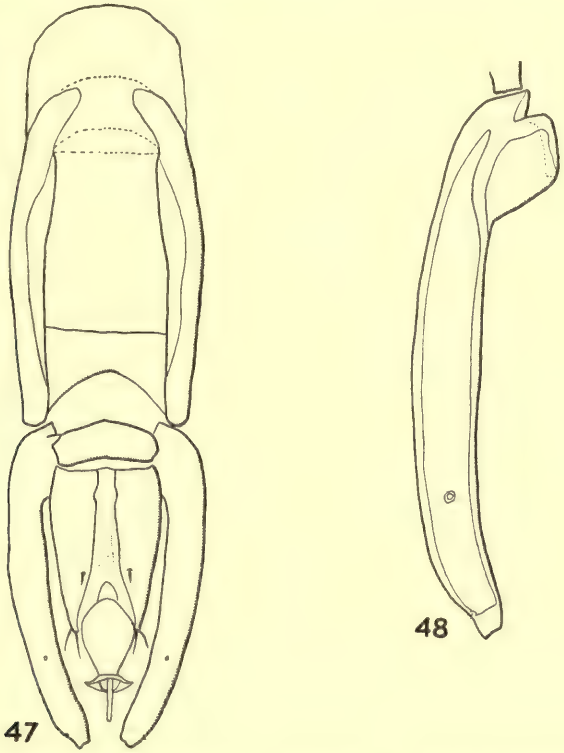
Pediculus lagopi (p. 220)

This appears to be a redescription of Linné's species of the same name and the host (*Tetrao lagopus*) is also the same.

J. C. FABRICIUS, 1781

(*Species Insectorum* . . . Hamburgi & Kilonii, Vol. 2, pp. 478–484)

This is little more than a list of names, and all the new names proposed in it have already been discussed. It need not detain us.



FIGS. 47, 48.—*Quadraceps hiaticulae* (O. Fabricius). 47 Male genitalia. 48. Paramere.

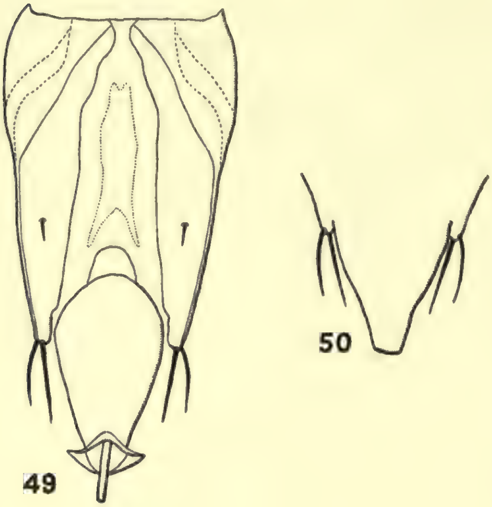
SCHRANK, 1781

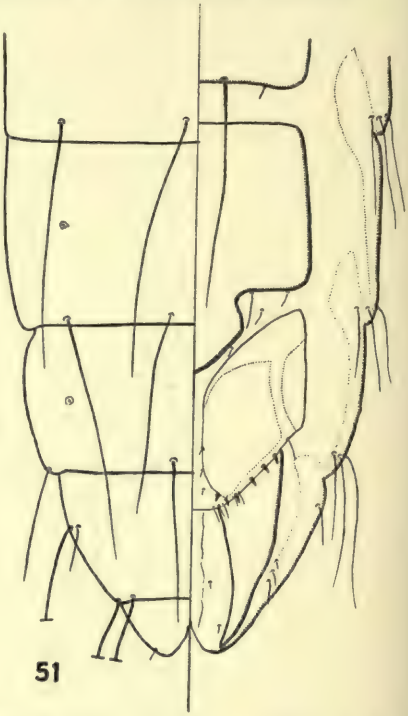
(*Enumeratio insectorum Austriae indigenorum.* Augustae Vindelicorum, pp. 499–507, pl. 1.)

We must confess to a great feeling of relief in getting away from the work of J. C. and O. Fabricius to that of Schrank, for (as before) his descriptions are for the most part accurate and are nearly all accompanied by figures which enable his species to be easily recognized.

Pediculus porcelli (p. 500, Pl. 1, fig. 1)

After being mentioned by Linné without indication, definition or description, this name was copied by almost every author with whom we have dealt, still as a *nomen nudum*, until Schrank finally described the species. The host is *Mus Porcellus*, the description is good and the figure excellent, considering the date. Schrank himself (1803 : 186) renamed the species *Pediculus saviae*, Olfers (1816 : 83) redescribed it as *Pediculus bifurcatus*, and Nitzsch (1818 : 304) proposed *Gyropus gracilis* as a *nomen novum* for it. Later authors have either used Nitzsch's name or referred the name *porcelli* to Linné, but the authorship of this name must be ascribed to Schrank.





FIGS. 49, 50.—*Quadraceps hiaticulae* (O. Fabricius). 49. Mesosome, ventral. 50. Distal end of mesosome, dorsal.

FIG. 51.—*Quadraceps hiaticulae* (O. Fabricius), terminal segments of the female abdomen.

The species has been excellently described and figured by Werneck (1936 : 398–402, figs. 1–9), and our neotypes agree with his description and figures.

Neotype male and *neallotype* female of *Gliricola porcelli* (Schrank) in the British Museum (Nat. Hist.) Collection (slides nos. 584–5) from tame guinea-pig, *Cavia porcellus* (Linn.), from Rio de Janeiro, Brazil. *Neoparatypes :* 14 males and 30 females from the same host species from Brazil, British Isles and S. Africa.

Pediculus ovis (p. 502, Pl. 1, figs. 8, 9)

This is a somewhat similar case to that of *porcelli*, since Linné mentioned the name without description and with only a queried reference to Redi, which does not save the name from being a *nomen nudum*. In passing it seems worth mentioning that the presence of the query suggests very strongly that what Linné had before him was not Redi's insect, for the latter's figure is not at all bad ; we suspect that Linné may have had a sucking louse. In any case the authorship of *ovis* must be assigned to Schrank.

The host is *Ovis aries* (domestic sheep) and the species is well known. Schrank (1803 : 187) renamed it *Pediculus ovisarietis*, Olfers (1816 : 85) described it as *Pediculus sphaerocephalus*, and Nitzsch (1818 : 296) proposed the new name *Trichodectes sphaerocephalus* for " Ped. Ovis Linn. Fabric." (*nomina nuda*), Schrank's species and the left-hand figure on Redi's pl. 22. Our neotypes of *ovis* Schrank are also automatically neotypes of the *nomina nova* proposed by Schrank (1803) and Nitzsch (1818), but are not neotypes of *sphaerocephalus* Olfers because this has an independent description.

The species has been excellently described and figured by Werneck (1936 : 537–540, figs. 169–174), and the neotypes agree with his figures and description.

Neotype male and *neallotype* female of *Damalinia ovis* (Schrank) in the British Museum (Nat. Hist.) Collection (slides nos. 586–7) from domestic sheep, *Ovis aries* Linn. from Rio de Janeiro, Brazil. *Neoparatypes :* 29 males and 37 females from the same host species from Brazil, E. Africa and New South Wales, Australia.

Pediculus anatis (p. 503, Pl. 1, figs. 2, 3)

The excellent description and the figures represent an *Anaticola*, and there is a reference to the upper figure of Redi's plate 10, which is *Anaticola anseris* (Linn.). The host is given as *Anas boschas varietas fera* (= *Anas p. platyrhynchos*), but fig. 2 of the plate is labelled *P. anseris*, which perhaps means that this specimen was taken from a goose. There can be little doubt that *anatis* Schrank is a mixture of *Anaticola anseris* (Linn.) and *A. crassicornis* (Scopoli), and it is probably the basis for Olfers' record of both *Anas* and *Anser* as hosts of the latter species and the subsequent appearance in the literature of a non-existent " *crassicornis* Olfers." In view of Schrank's host-record and choice of specific name, *anatis* must be held to apply primarily to *Anaticola crassicornis* (Scopoli), of which it is a synonym.

Neotype male of *Anaticola anatis* (Schrank) in the Meinertzhagen Collection (British Museum (Nat. Hist.)), slide no. 4242, from *Anas p. platyrhynchos* Linn. from N.E. Poland. This specimen agrees with the description and figures (Clay & Hopkins, 1951 : 17) of *A. crassicornis* (Scopoli).

Pediculus ortygometrae (p. 503)

This species, from *Rallus Crex* = *Crex crex* (Linn.), is not figured and the description is most unsatisfactory. The species was identified by Burmeister (1838 : 428) and by Denny with Nitzsch's manuscript name *Nirmus attenuatus*, and there are important reasons why this identification should be accepted if at all possible. The position is that *attenuatus* first appeared in print (Nitzsch, 1818 : 291) as a *nomen nudum*, a reference to *Pediculus ortygometrae* Schrank being queried. Burmeister gave no description of the insect but included the same reference without the query, thus making *Nirmus attenuatus* Burmeister a *nomen novum* for *P. ortygometrae* Schrank. Denny (1842: 52, 134, Pl. 10, fig. 2) described material from *Crex pratensis* (= *Crex crex* (Linn.)) as *Nirmus attenuatus* " Nitzsch," and " *N. attenuatus* Nitzsch " as subsequently described by Giebel from Nitzsch's manuscript (1874: 170, Pl. 6, fig. 1) appears to be congeneric with Denny's species. To interpret *P. ortygometrae* otherwise than was done by Burmeister and by Denny would raise serious difficulties with regard to the type species of *Rallicola.*

Schrank's description of *ortygometrae* is as follows : "Insectum oblongum. Caput cordatum, parte acuminata ab abdomine aversa ; antennae breves moniliformes. Thorax angustus, longus apice latior, apicis medio productiore. Abdominis segmenta, demta thorace octo setosa, utrinque spiraculis magnis maculatis instructa. Pedes thoraci affici, articulis tribus elliptoidibus constant, articulo tertio acuto, breviori. In capite varia transparent intestina ; ejusque apices utrinque setam longiusculam emittunt."

We considered the possibility that the various internal structures appearing in the head might be the conspicuous gular plate of *Pseudomenopon*, but this genus is excluded by the cordate head and the fact that the " apex " of the thorax is stated to be produced in the middle. We think *Fulicoffula* to be excluded by the statement that the insect is oblong and by the cordate head. *Incidifrons* is not known from *Crex crex*, but we have examined *I. fulicae* (Linn.) and this, in common with *Pseudomenopon*, has two long setae arising from the temporal angles (Schrank's " apices " of the head), whereas *Rallicola* has only one. Summing up, the whole of the very vague description could apply to *Rallicola* and the presence of only one long temporal seta is peculiar to this genus. It is legitimate to use as confirmation the fact that *Rallicola* is common on *Crex crex* and the other genera rare or unknown.

This species is distinguished from *R. cuspidatus* (Scopoli) (see Clay & Hopkins, 1951 : 25) by the shape of the head in both sexes, the absence of marked sexual dimorphism of the antennae, the male genitalia and the female genital region.

MEASUREMENTS IN MM. :

	Male		Female	
	Length	Breadth	Length	Breadth
Head	0·44	0·33	0·45	0·33
Prothorax	—	0·22	—	0·22
Pterothorax	—	0·29	—	0·28
Abdomen	0·86	0·42	0·92	0·42
Total	1·53	—	1·66	—
Genitalia	0·28	—	—	—

Neotype male (Text-figs. 52, 53) and *neallotype* female (Text-figs. 54, 55) of *Rallicola ortygometrae* (Schrank) in the British Museum (Nat. Hist.) Collection (slide nos. 570–1) from *Crex crex* (Linn.) from Scotland. *Neoparatypes :* 5 males and 3 females from the same host species from Scotland and France.

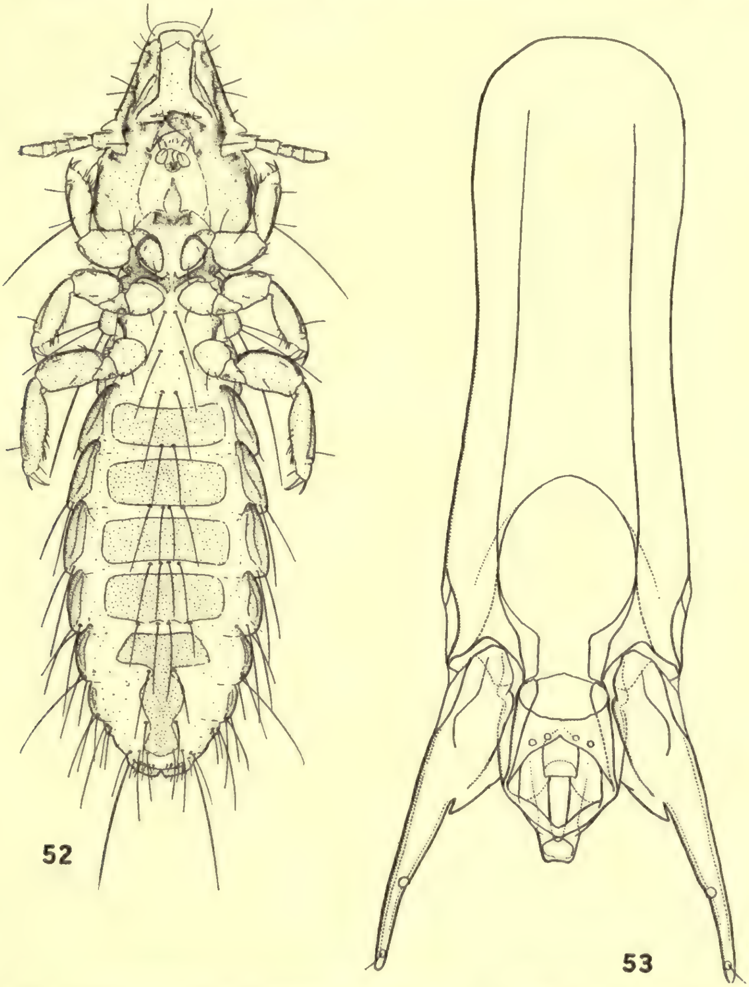
The material described by Denny as *Nirmus attenuatus* " Nitzsch " (one male in the British Museum (Nat. Hist.) Denny Collection) agrees with the neotype of *Ralli-*

cola ortygometrae (Schrank). There are no specimens of "*Oncophorus attenuatus* N.," as described by Piaget (1880 : 214, Pl. 18, fig. 1) in the Piaget Collection in the British Museum (Nat. Hist.).

FOURCROY, 1785

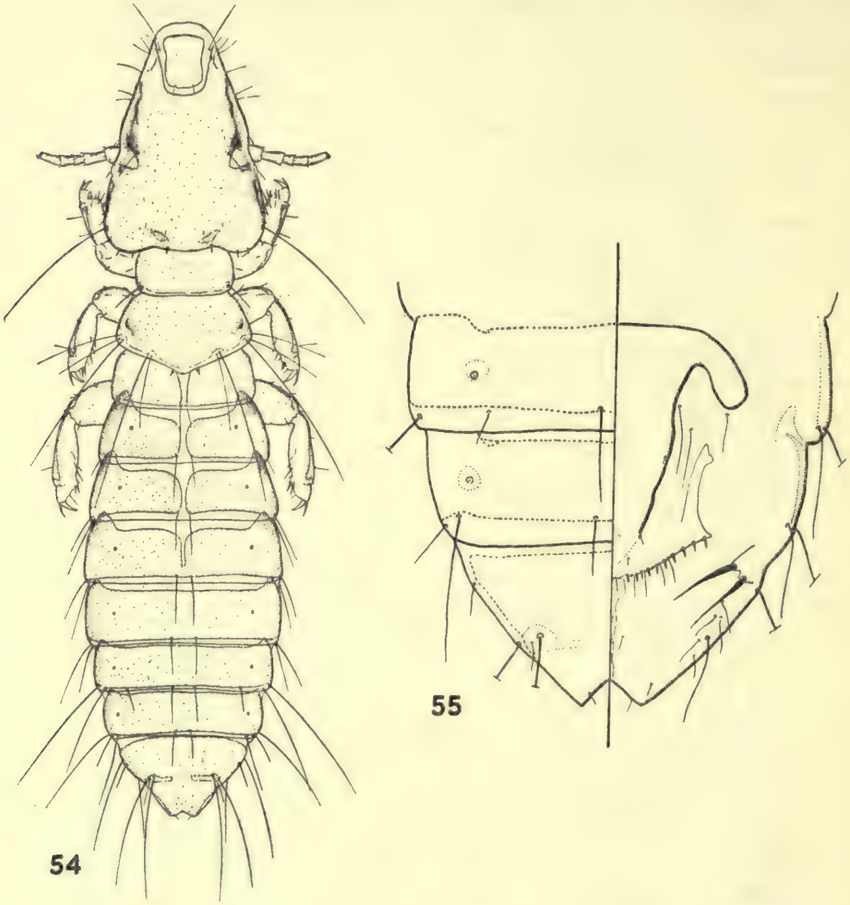
(*Entomologia Parisiensis*, Paris. Part 2, pp. 517–522)

The section of this work which deals with Anoplura and Mallophaga is in two different parts ; pages 517–519 contain a list of species of *Pediculus*, sometimes with brief descriptions or quotations of the descriptions of other authors (whose names are not mentioned), and all the names are in valid binomial form. But on pages 520–522, under a separate heading " pediculi Rhedi & Linnaei " there is a list in which every name which is not a *nomen nudum* is a descriptive phrase and has a partial



FIGS. 52, 53.—*Rallicola ortygometrae* (Schrank). 52. Male. 53. Male genitalia.

duplicate: "*Pediculus accipitris, abdomine oblongo*" and "*Pediculus accipitris, abdomine ovato,*" for instance. We conclude that these phrases on pp. 520–522 are not to be taken as names and are only in Latin because the whole work is in that language. On the other hand, the names on pp. 517–519 are undoubtedly valid and must be dealt with, because in three instances Geoffroy's descriptive phrases are first shortened to valid form in this work.



FIGS. 54, 55.—*Rallicola ortygometrae* (Schrank). 54. Female. 55. Terminal segments of female abdomen.

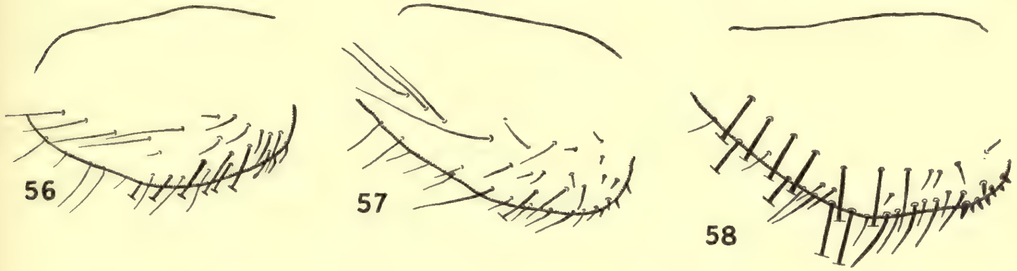
Pediculus circi (p. 518)

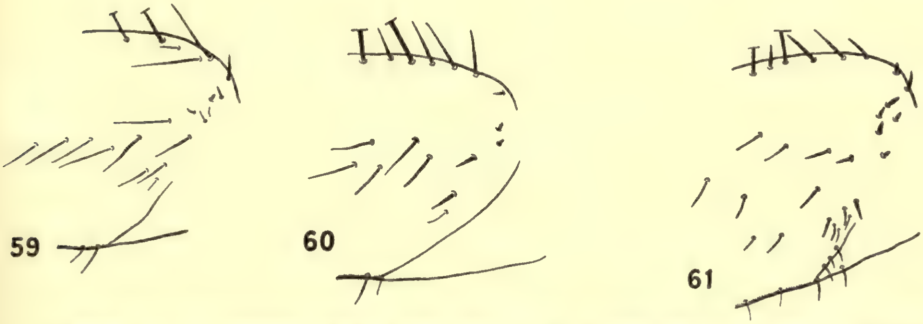
Proposed for Geoffroy's *Pediculus circi, fuscus oblongus* . . . , the identity of which has already been briefly discussed (Clay & Hopkins, 1950 : 270). Geoffroy's host-record is " Busard des marais, *circus* Bellon " (= *Circus aeruginosus* (Linn.)).

The same species was named *Pediculus milvi* by Schrank (1803 : 193) ; *Liotheum* (*Laemobothrion*) *giganteum* Nitzsch (1818 : 301) is composite and we shall restrict the name to the present species. *L. nigrolimbatum* Giebel was described from specimens taken from *Circus cineraceus* (= *C. pyargus* (Linn.)) and *Circus aeruginosus*, and in view of the loss of the types is best assumed to be the same as *circi* (Fourcroy).

The species of *Laemobothrion* from the Falconiformes can be divided into three main groups as follows (see also Kéler, 1937, and Eichler, 1943) :

1. Gular setae and lateral setae on prosternal plate absent . . *tinnunculi* group.
–. Gular setae and lateral setae on prosternal plate present . . . . 2.
2. Majority of abdominal tergites with central uncoloured area (Text-fig. 68) (*vulturis* group) 3.
–. Abdominal tergites without such areas . . . . . *maximum* group.
3. Lateral margins of anterior abdominal segments with dark, stout spine-like setae . . . . *glutinans* N.
–. Lateral margins of anterior abdominal segments without such setae rest of *vulturis* group.





FIGS. 56–58.—Posterior setae of 1st femur. 56. *Laemobothrion tinnunculi* (Linn.) 57. *L. circi* (Fourcroy). 58. *L. vulturis* (J. C. Fabricius).
FIGS. 59–61.—Proximal part of 2nd femur. 59. *L. tinnunculi*. 60. *L. circi*. 61. *L. vulturis*.

In addition the members of the *tinnunculi* group have the shape of the head distinctive, have only a few setae on the anterior margin of the prothorax, and never have a complete vertical line of setae along the outer edges of the patches of minute comb-like structures on abdominal sternites IV–V.[1] The *vulturis* group is further characterized by the presence in the female of a lateral pigmented spot each side posterior to the vulva (Text-fig. 67, x), and by the presence in both sexes of dark, stout spine-like setae on the margin of the first femur and on the margin and dorsal

[1] These are similar to those found in *Microtenia*.

surface of the proximal part of the second femur (Text-figs. 58, 61); the third femur may or may not have these setae. In general, members of the *vulturis* group tend to be larger and to have a greater number of stouter setae. In the *maximum* group some forms have (Text-figs. 57, 60) a few of these spine-like setae on the femora, smaller than those of the *vulturis* group; in the *tinnunculi* group the second femur (only) may have one or two small spine-like setae (Text-figs. 56, 59). Each of these groups will probably prove to be a polytypic species, the subspecies of which seem to be distinguished by the colour pattern (apparently correlated to a certain extent with the plumage colour of the host), the shape of the gular plate, the number and

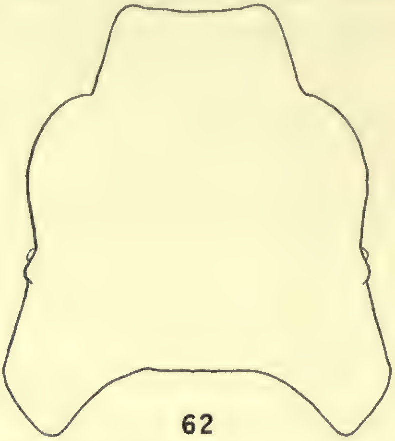
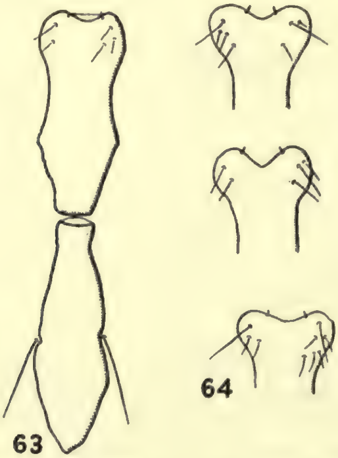


FIG. 62.—*Laemobothrion circi* (Fourcroy), male head, dorsal.



FIGS. 63, 64.—*Laemobothrion circi* (Fourcroy). 63. Female prosternal and meso-metasternal plates(unmounted specimen). 64. Proximal part of prosternal plates of three individuals to show variation in shape and number of setae (mounted canada balsam).

size of the setae, and the total length in the females. There is some individual variation in the numbers of gular and lateral setae of the prosternal plate which makes these characters unreliable for the separation of related forms; similarly the shape of the prosternal plate tends to vary (Text-figs. 63, 64). The position of the setae on the meso-metasternal plate (see Eichler, 1943 : 210) is also variable, due to variation in the posterior prolongation of this plate. The shape and size of the head, even where the total length is a distinguishing character, tend to be similar in related forms. It seems doubtful whether the male genitalia show any differences throughout the members of one group, but a greater amount of material is necessary in order to judge the amount of variation in the shape of the sclerites within populations from one host species.

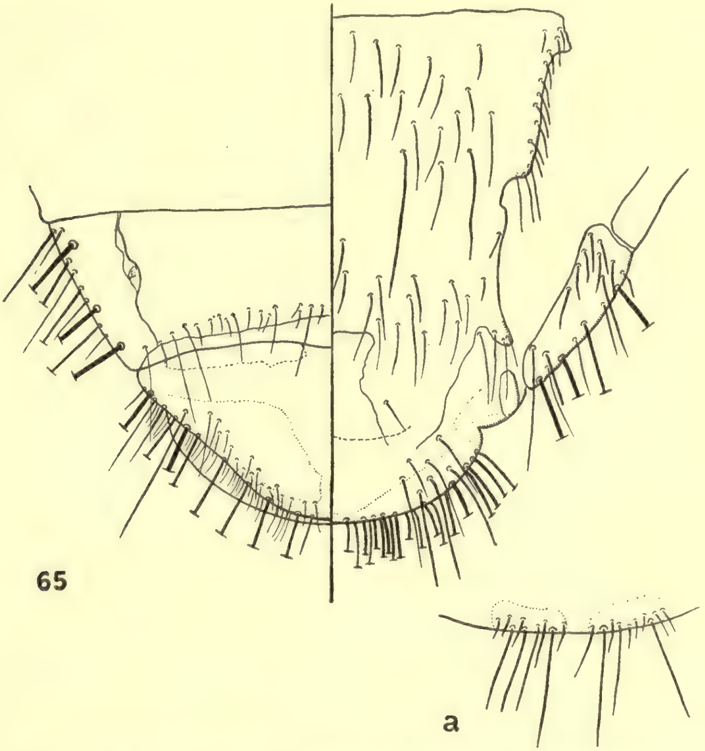


FIG. 65.—*Laemobothrion circi* (Fourcroy) male, terminal segments of abdomen. *a*. Anus (internal).

Of the four species described up to this date—1785—*L. tinnunculi* (Linn.) is quite distinctive (see Clay & Hopkins, 1950 : 228). *L. vulturis* (J. C. Fabricius) was redescribed (Clay & Hopkins, 1951 : 33) from a small amount of mounted material, but now through the kindness of Mr. B. K. Tandan (University of Lucknow) it has been possible to examine fresh material of this species and thus to amplify the descriptions and figures. It differs from other forms parasitizing the Aegypiinae mainly in size and possibly in colour pattern, but the available specimens of *Laemobothrion* from this subfamily are not in a condition to show this last character fully. The number and size of the setae tend to be greater in both sexes than in *circi* (cf. Text-figs. 66 and 67), but there is considerable individual variation in this character. In our first description (1951 : 34) it was suggested that the number of lateral prosternal setae was a diagnostic character, but the number of these in *L. vulturis* may vary, as shown for the following 4 males and 4 females (setae on left and right side of each prosternal plate) :

Male	4 + 5 ; 4 + 3 ; 5 + 3 ; 7 + 6
Female . . .	3 + 4 ; 4 + 6 ; 6 + 7 ; 7 + 6

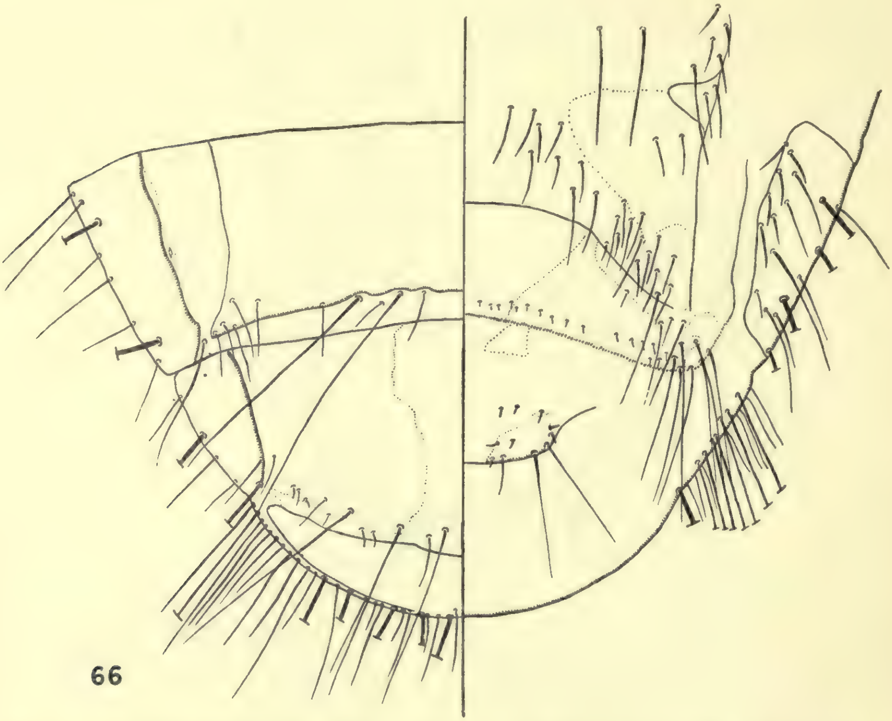


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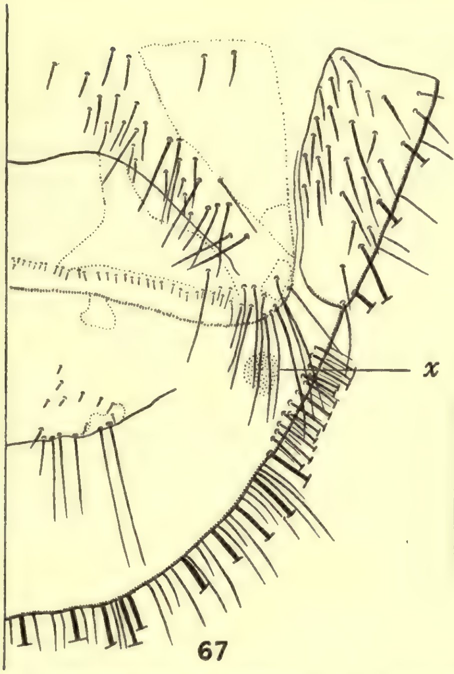
FIG. 66.—*Laemobothrion circi* (Fourcroy) female, terminal segments of abdomen.

This species has the form of the tergal plates (Text-figs. 68) and femoral setae (Text-figs. 58, 61) characteristic of the *vulturis* group. *L. maximum* (Scopoli) (see Clay & Hopkins, 1951 : 34) and *L. circi* (Fourcroy) belong to the *maximum* group, but owing to lack of material of *maximum* the differences (if any exist) between these two forms cannot be given. *L. circi* differs from *L. titan* Piaget (host : *Milvus m. migrans*) in the lesser degree of pigmentation and in the female by the shorter abdomen. In both sexes of *circi* abdominal tergites I–IV show signs of a median division.

MEASUREMENTS IN MM. :

	Male		Female	
	Length	Breadth	Length	Breadth
Head (midline	1·44	—	1·52	—
(laterally)	1·70	1·54	1·78	1·65
Prothorax	—	1·20	—	1·37
Pterothorax	—	1·63	—	1·87
Abdomen	4·95	2·20	6·00	2·80
Total	8·15	—	9·40	—
Genitalia	2·20	—	—	—



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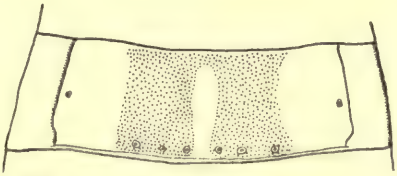

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FIG. 67.—*Laemobothrion vulturis* (J. C. Fabricius), Terminal segments of female abdomen, ventral. *x*. Post-vulval pigmented area.

FIG. 68.—*Laemobothrion vulturis* (J. C. Fabricius), third abdominal tergite, female.

Neotype male (Text-figs. 62, 65; Pl. 12, figs. 3, 4) and *neallotype* female (Text-figs. 57, 60, 63, 64, 66; Pl. 12, fig. 5) of *Laemobothrion circi* (Fourcroy) in the British Museum (Nat. Hist.) Collection (slide no. 609) from *Circus a. aeruginosus* (Linn.) from Kenya. *Neoparatypes :* 26 males and 20 females from the same host form from Kenya, Yugoslavia and India.

Pediculus passeris (p. 519)

A binomial name for Geoffroy's descriptive phrase " *Pediculus subflavescens : abdomine ovato* . . . " (see Clay & Hopkins, 1950 : 270), but with a brief description which may perhaps be independent. The point is not of much importance, as both descriptions clearly indicate a *Philopterus* and the host is the same : "moineau franc" (= *Passer domesticus*).

The earliest name for the *Philopterus* from *Passer domesticus* is *P. fringillae* (Scopoli) (see Clay & Hopkins, 1951 : 32) and *passeris*, therefore, becomes a synonym of this latter name.

Neotype male of *Philopterus passeris* (Fourcroy) in the Meinertzhagen Collection (British Museum (Nat. Hist.)), slide no. 15778 from *Passer d. domesticus* (Linn.) from Cornwall, England. This specimen agrees with the figures and description (Clay & Hopkins, 1951 : 32 ; fig. 43 ; Pl. 3, fig. 3) of *P. fringillae* (Scopoli).

Pediculus corvi (p. 519)

Proposed for Geoffroy's "*Pediculus albo nigroque varius . . .*" The host is "corbeau," which may mean crow or raven, though usually the latter. Geoffroy's species is certainly a *Philopterus*.

Philopterus corvi (Fourcroy) is preoccupied both in *Pediculus* and in *Philopterus*, for if not the same as *Philopterus corvi* (Linn.) it is a homonym of the latter. It is therefore unnecessary to try to fix it more closely.

MOHR (N.), 1786

(*Forsøg til en Islandsk Naturhistorie.* Kiøbenhavn)

Pediculus procellariae (p. 103)

There is a short Latin description but no host-record other than that provided by the name, which is preoccupied by *Pediculus procellariae* J. C. Fabricius, 1775.

We consider *Pediculus procellariae* Mohr, 1786, *nec* J. C. Fabricius, to be completely unrecognizable.

ACKNOWLEDGMENTS

We are indebted to the Trustees of the British Museum for permission to publish Text-figs. 12, 33, 53, drawn by Mr. A. J. E. Terzi, to the Zoological Society of London for permission to publish figures 52–55, and to Colonel Meinertzhagen for permission to publish Text-figs. 29 and 31, drawn by Mr. R. S. Pitcher. Text-figs. 5 and 18 were drawn by Mr. A. Smith, and the remaining figures by Miss T. Clay.

TABLE I.—*Breadth (in mm.) of Head at Temples of Male* Philopterus *populations with Number of Specimens.*

	0·45–0·46	0·47–0·48	0·49–0·50	0·51–0·52
citrinellae . .	3	22	2	—
curvirostrae . .	1	16	4	—
pyrrhulae . .	—	2	4	6
chloridis . .	—	18	6	2

TABLE II.—*Breadth (in mm.) of Head of Female* Philopterus *populations with Number of Specimens*

	0·47–0·48	0·49–0·50	0·51–0·52	0·53–0·54	0·55–0·56	0·57–0·58	0·59–0·60
citrinellae . .	1	3	6	16	4	—	—
curvirostrae . .	—	1	11	12	4	1	—
pyrrhulae . .	—	2	3	2	5	19	1
chloridis . .	—	2	1	7	8	12	—

LIST OF SPECIES

The synonymy of the following names has been established:

Specific name	Present status	Page.
agonum Nitzsch	*Ricinus rubeculae* (Schrank)	224
alaudae Schrank	*Menacanthus alaudae* (Schrank)	226
anatis Schrank	*Anaticola crassicornis* (Scopoli)	225
arcticus Mjöberg	*Saemundssonia tringae* (O. Fabricius)	249
attenuatus Burmeister	*Rallicola ortygometrae* (Schrank)	255
bassani O. Fabricius	*Pectinopygus bassani* (O. Fabricius)	247
bifurcatus Olfers	*Gliricola porcelli* (Schrank)	254
canis De Geer	*Trichodectes canis* (De Geer)	243
canis O. Fabricius	*Trichodectes canis* (De Geer)	244
chloridis Schrank	*Philopterus citrinellae* (Schrank)	229, 232
circi Fourcroy	*Laemobothrion circi* (Fourcroy)	258
citrinellae Schrank	*Philopterus citrinellae* (Schrank)	227, 232
clangulae O. Fabricius	*Anaticola clangulae* (O. Fabricius)	246
communis Nitzsch	*Philopterus citrinellae* (Schrank)	228
compar Piaget	*Philopterus curvirostrae* (Schrank)	229
cornicis De Geer	*Myrsidea cornicis* (De Geer)	237
curuccae Schrank	*Menacanthus curuccae* (Schrank)	223
curvirostrae Schrank	*Philopterus curvirostrae* (Schrank)	229, 232
emberizae De Geer	*Philopterus citrinellae* (Schrank)	237
fringillae De Geer	*Ricinus fringillae* De Geer	235
gallinae De Geer	*Goniocotes gallinae* (De Geer)	242
giganteum Nitzsch	*Laemobothrion circi* (Fourcroy)	258
globifer Olfers	*Philopterus citrinellae* (Schrank)	228
gracilis Nitzsch	*Gliricola porcelli* (Schrank)	254
grylle O. Fabricius	*Saemundssonia grylle* (O. Fabricius)	247
hiaticulae O. Fabricius	*Quadraceps hiaticulae* (O. Fabricius)	251
hologaster Nitzsch	*Goniocotes gallinae* (De Geer)	242
lari De Geer	*Trinoton querquedulae* (Linn.)	239
lari O. Fabricius	*Saemundssonia lari* (O. Fabricius)	248
lariphaga Timmermann	*Saemundssonia lari* (O. Fabricius)	248
latus Nitzsch	*Trichodectes canis* (De Geer)	244
leontodon Nitzsch	*Sturnidoecus sturni* (Schrank)	232
megacephalus Denny	*Saemundssonia grylle* (O. Fabricius)	247
mergi J. C. Fabricius	*Anaticola c. mergiserrati* (De Geer)	241
mergiserrati De Geer	*Anaticola c. mergiserrati* (De Geer)	240
mesoleucum Nitzsch	*Myrsidea cornicis* (De Geer)	237
milvi Schrank	*Laemobothrion circi* (Fourcroy)	258

Specific name	Present status	Page
minutum Nitzsch	*Menacanthus curuccae* (Schrank)	223
nigrolimbatum Giebel	*Laemobothrion circi* (Fourcroy)	259
nitidissimus Nitzsch	*Ricinus fringillae* De Geer	236
ortygometrae Schrank	*Rallicola ortygometrae* (Schrank)	255
ovis Schrank	*Damalinia ovis* (Schrank)	254
ovisarietis Schrank	*Damalinia ovis* (Schrank)	255
parviceps Piaget	*Menacanthus alaudae* (Schrank)	226
passeris Fourcroy	*Philopterus fringillae* (Scopoli)	263
phasiani J. C. Fabricius	*Chelopistes phasiani* (J. C. Fabricius)	234
porcelli Schrank	*Gliricola porcelli* (Schrank)	254
procellariae Mohr	Unrecognisable	264
pterocephalus Olfers	*Ricinus rubeculae* (Schrank)	224
pyrrhulae Schrank	*Philopterus citrinellae* (Schrank)	229, 232
pyrrhulae Piaget	*Philopterus citrinellae* (Schrank)	229
rubeculae Schrank	*Ricinus rubeculae* (Schrank)	223
saviae Schrank	*Gliricola porcelli* (Schrank)	254
sphaerocephalus Olfers	*Damalinia ovis* (Schrank)	255
sphaerocephalus Nitzsch	*Damalinia ovis* (Schrank)	255
sturni Schrank	*Sturnidoecus sturni* (Schrank)	232
subaequalis Haan	*Myrsidea cornicis* (De Geer)	238
temporalis Nitzsch	*Anaticola c. mergiserrati* (De Geer)	241
tringae Fabricius	*Saemundssonia tringae* (O. Fabricius)	249

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BRITISH MUSEUM NATURAL HISTORY
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16 MAR 1954

EXPLANATION OF PLATES

PLATE 10

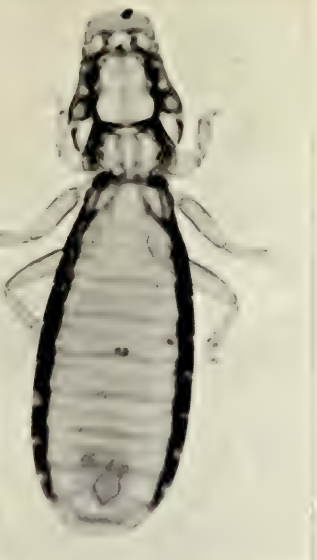
FIG. 1. *Ricinus rubeculae* (Schrank), ♂. ×28.
FIG. 2. *Ricinus rubeculae* (Schrank), ♀. × 28.
FIG. 3. *Menacanthus alaudae* (Schrank), ♀. × 55.
FIG. 4. *Philopterus citrinellae citrinellae* (Schrank). ♂. × 62
FIG. 5. *Sturnidoecus sturni* (Schrank), ♂. × 51.
FIG. 6. *Ricinus fringillae* De Geer, ♀. × 25.

PLATE 11

FIG. 1. *Myrsidea cornicis* (De Geer), ♂. × 45.
FIG. 2. *Anaticola mergiserrati* (De Geer), ♂. × 37.
FIG. 3. *Anaticola mergiserrati* (De Geer), ♀. × 29.
FIG. 4. *Saemundssonia grylle* (O. Fabricius), ♂. × 38.
FIG. 5. *Saemundssonia lari* (O. Fabricius), ♂. × 38.
FIG. 6. *Saemundssonia tringae* (O. Fabricius), ♂. × 66.

PLATE 12

FIG. 1. *Quadraceps hiaticulae* (O. Fabricius), ♂. × 47.
FIG. 2. *Quadraceps hiaticulae* (O. Fabricius), ♀. × 47.
FIG. 3. *Laemobothrion circi* (Fourcroy), ♂. × 11.
FIG. 4. *Laemobothrion circi* (Fourcroy), ♂ genitalia. × 42.
FIG. 5. *Laemobothrion circi* (Fourcroy), ♀. × 11.



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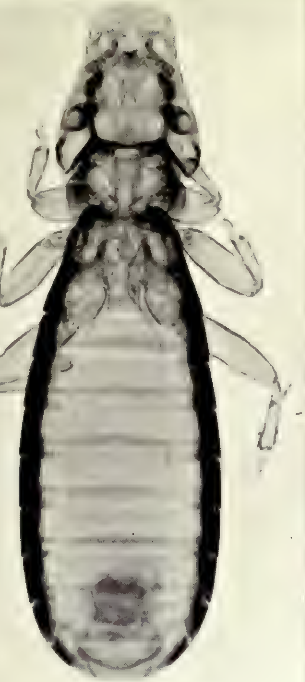

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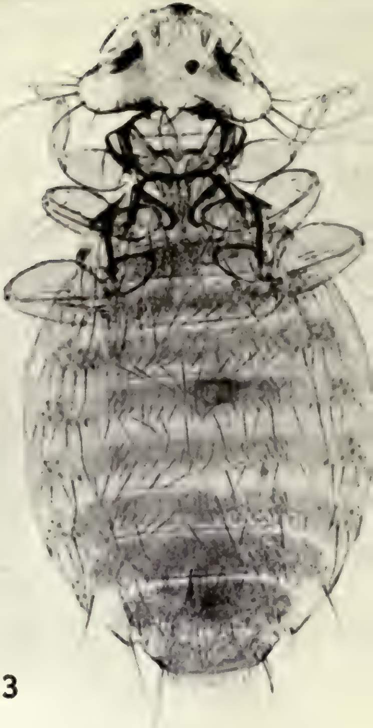

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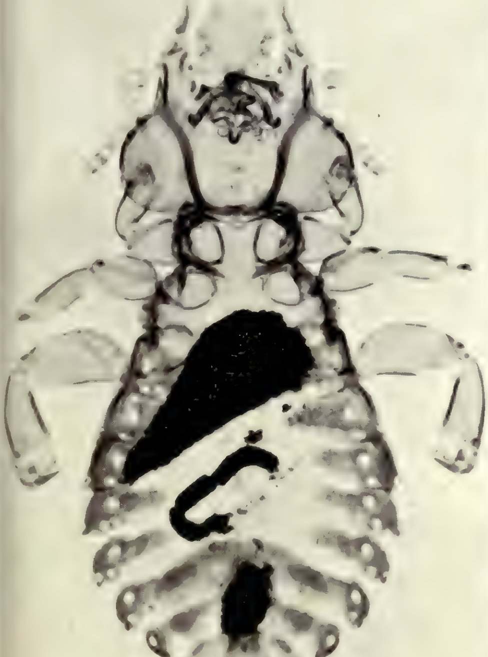

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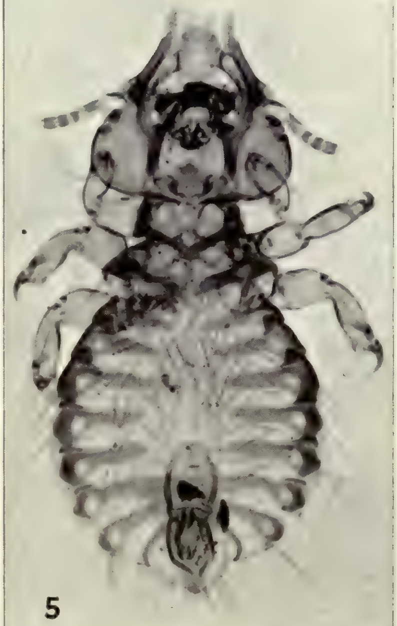

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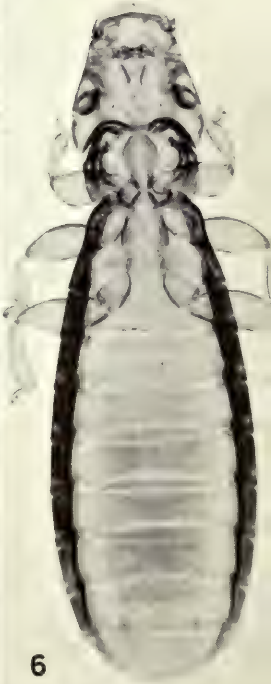

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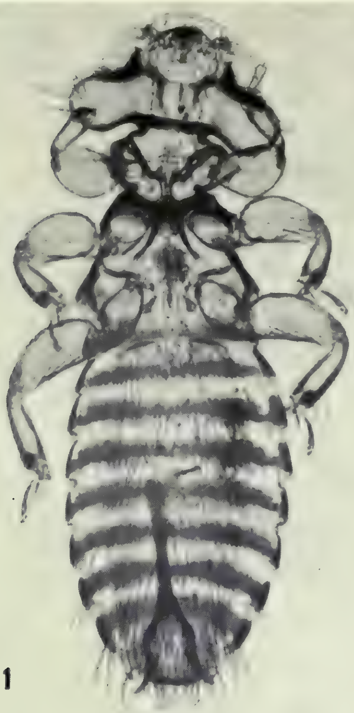
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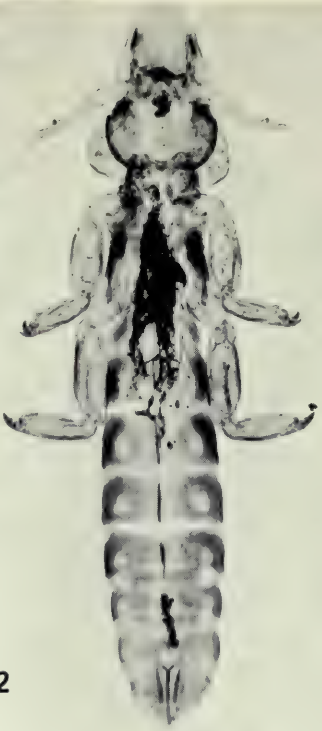
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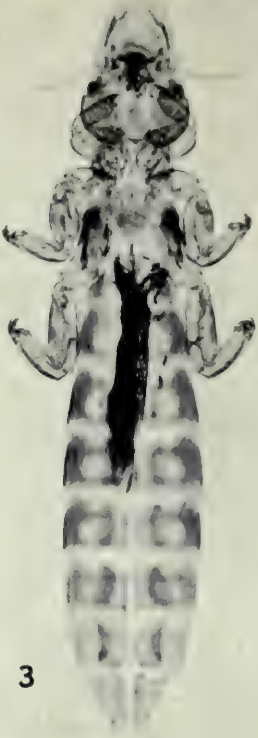
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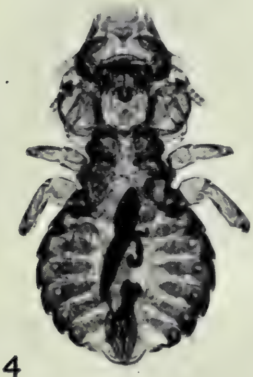
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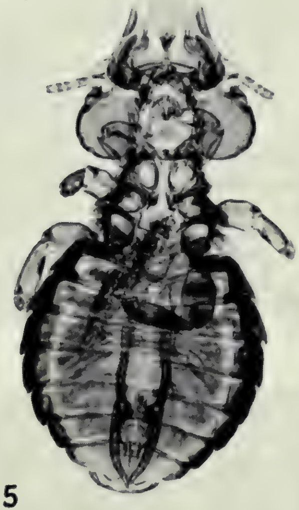
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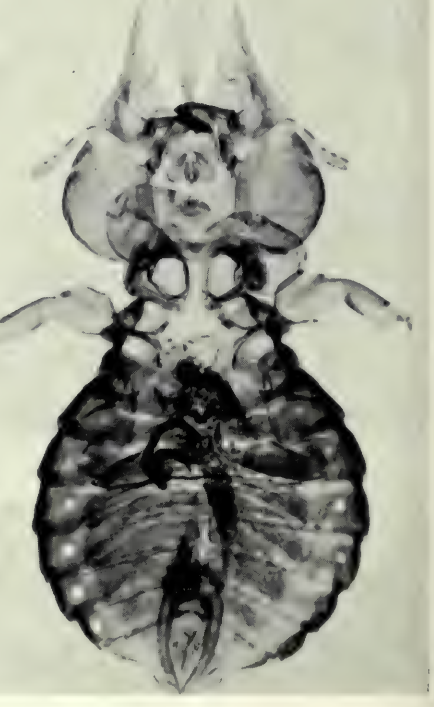
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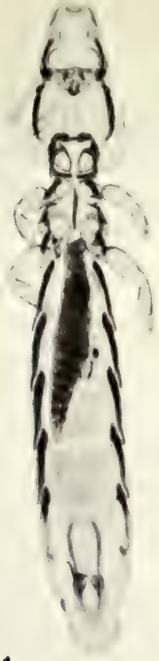
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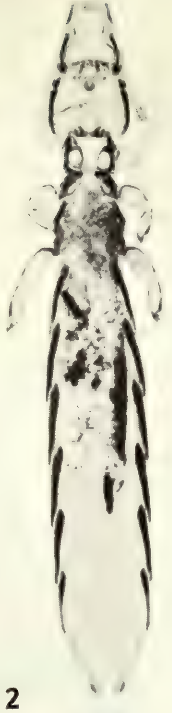
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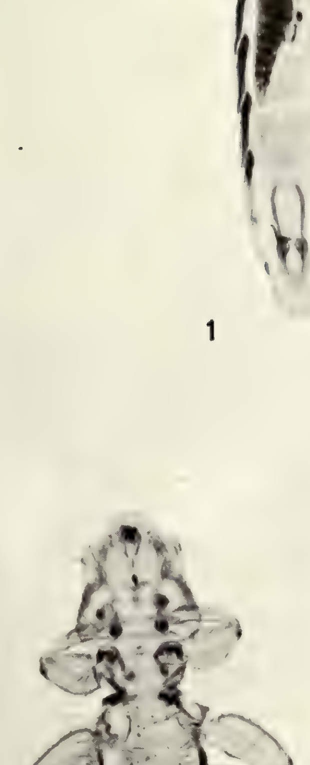
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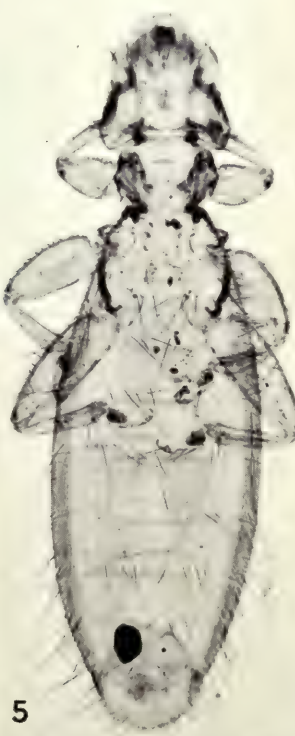
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(HYMENOPTERA : SYMPHYTA)

R. B. BENSON

BULLETIN OF
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ENTOMOLOGY Vol. 3 No. 7
LONDON : 1954

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HYMENOPTERA : SYMPHYTA

BY

ROBERT B. BENSON

Pp. 267–296 ; 31 *Text-figures*

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THE BULLETIN OF THE BRITISH MUSEUM (NATURAL HISTORY). *instituted in* 1949, *is issued in five series corresponding to the Departments of the Museum, and an Historical Series.*

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SOME SAWFLIES OF THE EUROPEAN ALPS AND THE MEDITERRANEAN REGION (HYMENOPTERA : SYMPHYTA)

By ROBERT B. BENSON

SYNOPSIS

The paper deals mainly with new or little-known sawflies (Hym. Symphyta) collected in recent years in Cyprus and other parts of the Mediterranean Region with a few from the European Alps. In all 16 new species and 5 new subspecies are described, and 4 are reinstated from the synonymy.

A list is also included of the sawflies collected for the Museum in Cyprus by Mr. G. A. Mavromoustakis.

THE following species or subspecies of sawflies are nearly all from the Central European Alps or the lands in or bordering the Mediterranean, and most of them are described here for the first time. The specimens on which the new forms are being based have come to me from many sources and have been accumulating in the British Museum (Natural History) awaiting description over several years, although not all of them belong to that institution. I should like here to thank all those who have sent me the specimens and especially those who have waited patiently a long time for results.

At the end of the paper I have included a list of all the sawflies collected in Cyprus for the British Museum by Mr. G. A. Mavromoustakis. Three of these species were also found by Dr. Håkan Lindberg during his stay in Cyprus in 1939 and I am indebted to him for lending me his material for study. As virtually no records of sawflies from Cyprus have been published before, except for some Cephidae by Benson (1946), most of these records are new; and the list probably includes all the species that have yet been collected on the island.

I am using here, as I have before, the expression ***"(statu novo)"*** or ***"(stat. nov.)"*** after a species name to indicate that I am changing its status, raising for example a subspecies to the level of a species. I now propose to introduce still another of these expressions, ***"(species revocata)"*** or ***"(sp. rev.)"***, to draw attention to the fact that the species referred to is being recalled from wrong synonymy ; " (*genus revocatum*) " and " (*nomen revocatum*) " may be used in a similar way.

POL : OOL is a well known abbreviation in Hymenoptera to indicate the comparative distance between the posterior ocelli (i.e., posterior ocellar line = POL) and the distance between one of these ocelli and the eye margin (i.e., ocellar ocular line = OOL). In the same way I am using the abbreviation OO-CL to indicate the distance between a hind ocellus and occipital-carina or the hind margin of the head where this carina would be if it were developed (i.e., ocellar occipital-carina line).

CEPHIDAE

Calameuta festiva sp. n.

♀. Black except for the following parts which are yellow : apical half of the front femur, the front tibia and the front tarsus, extreme apex of the middle femur, sides of the 3rd tergite, whole of the 4th and 5th except medially behind, sides of the 6th and 7th, 8th except the extreme lateral margins, also spot each side of 3rd, 4th and 5th sternites. *Wings* hyaline with stigma and venation piceous except for extreme base of C in forewing which is yellow.

Head with eyes slightly closer together in front than the height of one ; distance between antennal sockets about ⅔ as long as the distance between an antennal socket and the anterior tentorial pit on the same side (ant. ant. : ant. tent. as 1·0 : 1·5). *Antenna* 21-segmented ; club thickening from 9th to 13th segment ; penultimate segments about ⅔ as long as broad. *Thorax* and *abdomen* normal but legs with subbifid tarsal claws and hind tibia with 2 pre-apical spines ; cerci about ½ as long as sawsheath and reaches back as far ; sawsheath ½ as long as basal plate.

Pubescence on head and thorax above dark ; pale and evenly distributed on underthorax and whole of abdomen ; on head, pronotum and anterior and lateral lobes of mesonotum the pubescence is about ½ as long as the diameter of an ocellus. *Punctation :* head shining between the small follicles on the face but at the back of the head these are dense and conspicuous ; prothorax likewise has only very fine follicles, but medial lobe of the mesonotum is dull with fine dense punctures ; lateral lobes shining with large widely-separated punctures in the middle and behind though on the anterior ¼ and the outer lateral margin the punctures are a little smaller and closer together though much larger than those on the anterior lobe, and the interspaces are still shining ; scutellum almost impunctate ; mesopleura covered with large shallow follicles. Abdomen with the surface roughened by the dense follicle. *Length* 9·5 mm.

CYPRUS : Yerasa, 1000 ft., 1 ♀ (Holotype), 2.iv.1945 (*G. A. Mavromoustakis*) (British Museum).

This species is superficially like *C. gaullei* (Konow), from Algeria, which, however, is distinguished by its much more heavily infuscated wings and by the punctation of the lateral mesonotal lobes (dull with dense punctures as is the anterior lobe), by the punctation of the anterior margin of the scutellum, and by its ant. ant. : ant. tent. ratio of 1·0 : 2·0 (see Benson, 1946). Structurally it is much more like *C. apicicornis* Pic (on the basis of a ♀ collected at Jerusalem, 2.iv.1941, by Mr. H. Bytinski-Salz) which has very similar sculpture, but this species can be distinguished by its rich marking of yellow on the face and the thorax, and by the longer sawsheath (sawsheath : basal plate as 1·0 : 1·8) with its broad subtruncate apex when viewed from above. *C. idolon* Rossi is distinguished by its rich yellow colouring on face and pronotum, its yellow costa and stigma in the forewing, and the thicker club of its antenna (the subapical segments of which are about twice as broad as long), and its single pre-apical spine on the hind tibia as well as by its ant. ant. : ant. tent. ratio of 1·0 : 2·0.

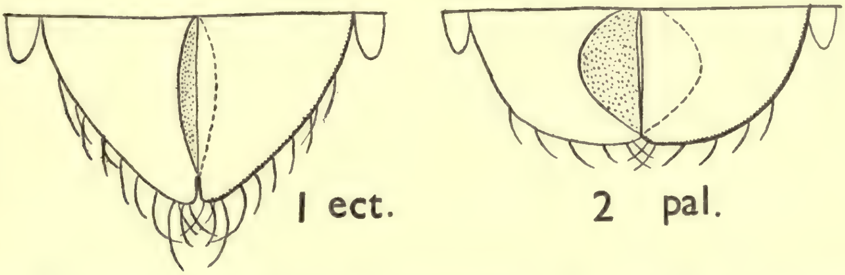
ARGIDAE

Kokujewia palestina sp. n.

♀. Head black. Thorax with mesonotum including scutellum reddish yellow (except for the depressed lateral and hind margins of the side lobes and the hind margin of the scutellum which are black); underside, metanotum and legs entirely black. Abdomen reddish yellow except for 1st tergite and sawsheath which are black. *Wings* smoky with a black spot under the base of the stigma; stigma and venation black.

In *structure* not distinguishable from *K. ectrapela* Konow except that the sawsheath is broadly rounded behind (Figs. 1 and 2) (instead of narrowing to a rounded point) and the hind basitarsus is about as long as the three following tarsal segments together (instead of clearly longer than this). *Length* 10 mm.

PALESTINE: Wadi Umbaghik, larva on ? *Rumex* 1♀ (Holotype) emerged iii.1945 (*H. Bytinski Salz*) (*British Museum*).



FIGS. 1–2.—Sawsheath of *Kokujewia* spp. from above: (1) *ectrapela*; and (2) *palestina*.

I am indebted to the late Dr. Gussakovskiĭ for giving to the British Museum a paratype of *K. ectrapela* (Caucasus and Transcaucasia) with which I have been able to compare the specimen from Palestine. *K. ectrapela* differs, in addition to the characters in the form of the sawsheath and tarsi mentioned above, in having a black scutellum and a red supra-clypeal area. *K. clementi* Zirngiebl (Anatolia), the only other described species in the genus, is said to differ from *K. ectrapela* in having a black medial stripe on the mesonotum and red on the frons.

CIMBICIDAE

Abia plana sp. n.

♀. *Colour* dark metallic green; antenna with apex of 3rd segment, 4th, and obscurely 5th and 6th brown; 1st, 2nd, base of 3rd and 7th black; labrum and mouthparts piceous; legs with coxae, trochanters and femora (except for apices) black; apices of femora, tibiae and tarsi yellowish brown, slightly fuscous beneath on the hind legs. *Wings* as in *A. sericea* L. but that the apical cloud is obsolete.

Head as in *A. sericea* L. but that the surface is entirely dull with fine coriaceous sculpture round the orbits and between the punctures. *Thorax* dull with fine coriaceous surface sculpture between the punctures which are mostly smaller than the interspaces between them. *Legs* as in *A. sericea* L., but that the inner tooth of the tarsal claw is broader and longer than the end tooth (Fig. 3). *Abdomen* with the tergites flat, not longitudinally arched as they are in *A. sericea*; and dull all over with dense hair follicles in the middle parts of each tergite while the margins and sides are densely coriaceous and the whole is covered in a fine dense pile; hypopygium simple (not produced slightly in the middle as it is in *A. sericea*); sawsheath parallel-sided in dorsal view and trifid at apex; cerci long and extending back almost as far as the apex of the sawsheath; saw very similar to that of *A. fulgens*. *Length* 13 mm.

♂. As in ♀, but the eyes above approach to each other to a distance that is little more than ½ the diameter of an ocellus, the 4th, 5th and 6th abdominal tergites each have the central quarter modified as in *A. sericea* and covered with a dense fine mat of short black tomentum surrounded by a shining glabrous margin, but, unlike *A. sericea*, etc., the modified areas are scarcely depressed and are (as in *A. fulgens*) in the same plane as the lateral portions of the same tergites. *Length* 11·5 mm.

HUNGARY: Retyezáth, 1,200–1,800 ft., 1♂, 1♀ (Holotype), 6–7.vi.1937, 1 ♂, 24.v–4.vi.1937 (*B. Lipthay*) (British Museum).

This species is very close to *A. fulgens* Zaddach as is shown by the very similar saws (vide Kangas, 1946, fig. 1*a*) and by the fact that in these 2 species alone of the European species known to me[1] the tomentum patches on the modified portions of the 4th to 7th abdominal tergites in the male are not depressed below the level of the rest of the tergite (in *A. sericea* L., *nitens* L., *candens* Konow, *melanocera* Cameron, *imperialis* Cameron and *vitilisi* Turner the tomentum patches are in depressions). The new species is, however, at once distinguishable from *A. fulgens* by its heavier punctation and by its tarsal claws, which have the inner tooth minute in *A. fulgens* but larger than the end tooth in the new species (cf. Figs. 3 and 4).

Corynis semisanguinea (Pic.)

The description by Pic (1916[1]) of this species from Algiers and of *C. subcarinata* from Greece (1916[2]) seem generally to have been overlooked; Gussokovskiĭ (1947), for example, omitted them from his key to the genus. I had in fact already prepared a description of the specimens before me as a new species and informed the collector about this when I came upon Pic's paper quite by chance. So far as Pic's description goes it covers Guichard's specimens very well and I think it probably refers to the same species, but as Pic's description is very incomplete as well as being generally inaccessible I include a fuller description herewith:

---

[1] Excluding those species which Kangas places in *Abia* (*Aenoabia*) and which really belong to *Zaraea* as defined in Benson, 1951.

♀. Reddish yellow with the following parts bronzey black: antennae and head (except for the fronto-clypeal area below the antennae), longitudinal fleck in the middle of each of the lateral lobes of the mesonotum, sunken lateral parts of the mesonotum beside the mesoscutellum, metanotum (except for the meta-post-scutellum), mesosternum, mesepimeron, front and lower part of mesepisternum, metapleura, coxae, trochanters, basal half of fore and middle femora, and extreme base of hind femur, 1st and 2nd tergites except at sides above, a medial fleck on each of the 3rd, 4th and 5th tergites, the medial part of the margins between these segments, a broad broken band on the hind margin of the 8th tergite, almost the whole of the underside of the abdomen with the sawsheath (except the apex of the hypopygium and the 9th sternite).

Wings hyaline with stigma costa and rest of venation yellow.

Antenna (Fig. 6) with 3rd segment twice as long as 4th; 3rd +4th = 5th; 5th a little more than 1½ times as long as broad (1·0 : 1·7). Head with malar space about as long as ½ diameter of front ocellus; POL : OOL as 1·0 : 0·8; POL : OO-CL as 1·0 : 0·6. *Pubescence* on head and thorax grey and upstanding, the longest hairs being about the same as the diameter of an ocellus; on abdomen fine, dense and recumbent.

Punctation: the larger punctures over almost the whole of the upper surface are interspaced with more numerous very fine punctures; on the middle of the mesonotum, scutellum, middle of mesopleura, and middle of the abdomen, the larger punctures are mostly separated from each other by from 1–2 diameters; on the head the punctures are coarser than on the body, and, round the orbits, between the antennae and on the postocellar area are very densely spaced and partly confluent; on the sides of the apical tergites the punctures are also very densely set. *Length* 6·5 mm.

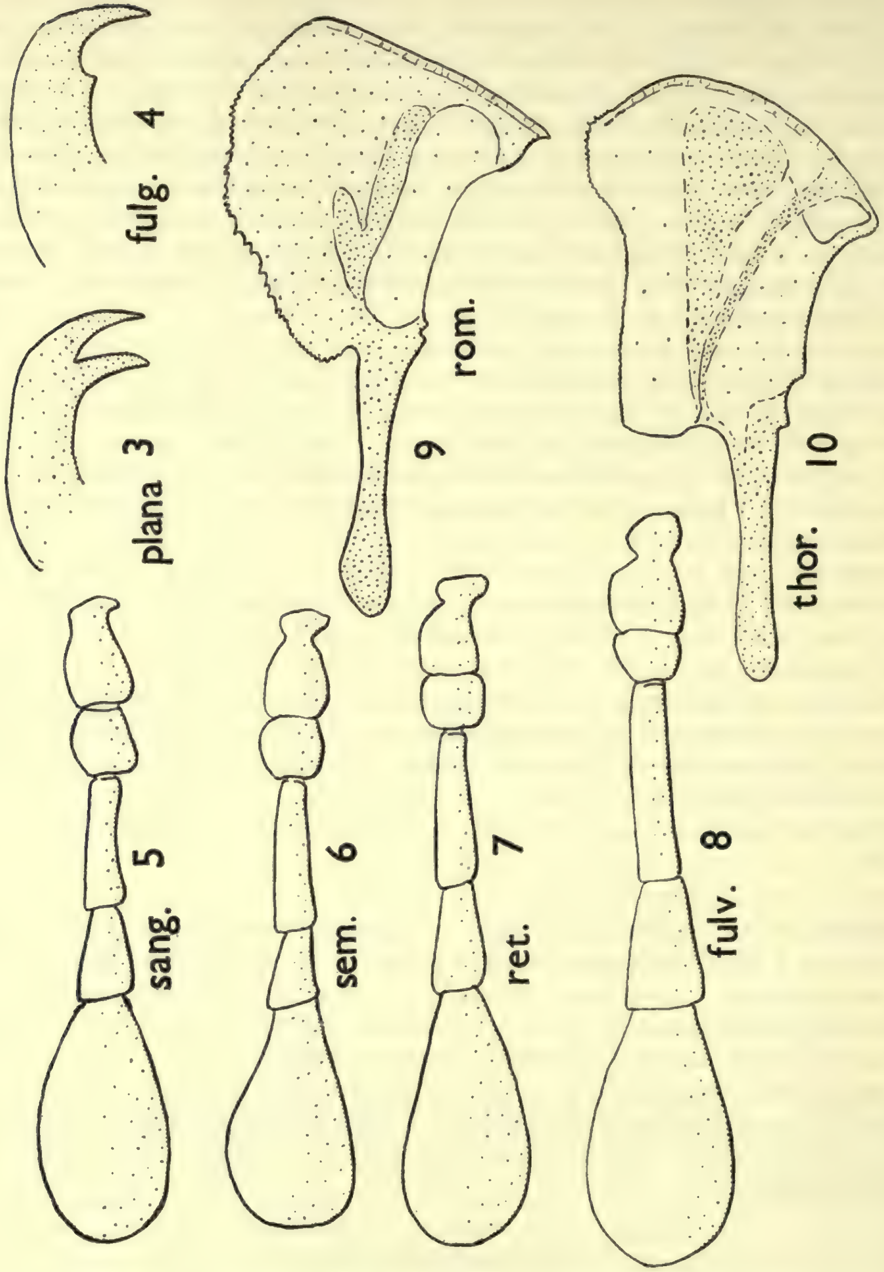
TRIPOLITANIA: 75 km. S. of Bou Ngem, 5 ♀, 4.ii.1952 (*K. M. Guichard*) (British Museum).

Superficially this species is very like *C. sanguinea* (Vollenhoven) of which I have before me 1 ♀ from the Canary Islands (Tho. V. Wollaston Coll., B.M. 1869–65). The punctation in *C. sanguinea*, however, is very much denser; on the mesonotum, for example, many of the larger punctures are contiguous or with interspaces little more than a diameter. Furthermore in *C. sanguinea* the 3rd segment in the antenna is only about 1½ times as long as the 4th, and the club, forming the 5th segment, is about twice as long as broad (cf. Figs. 5 and 6). The abdomen is also paler above in colour, and the stigma and apex of the costa are blackish brown instead of yellow.

Corynis reticulata sp. n.

♂. Black except for the yellowish white tarsi, tibiae and extreme apices of femora. Wings hyaline; stigma and rest of venation yellowish brown.

Antenna (Fig. 7) with 3rd segment 1½ times as long as 4th; 5th (club) = 3rd + 4th; 5th about twice as long as wide. *Head* with malar space very short, scarcely


fulg. 4
plana 3
rom. 9
thor. 10
sang. 5
sem. 6
ret. 7
fulv. 8

FIGS. 3–4. Hind tarsal claw in *Abia* spp. : (3) *plana* ; and (4) *fulgens*.

FIGS. 5–8. Antenna in *Corynis* spp. : (5) *sanguinea* ; (6) *semisanguinea* ; (7) *reticulata* ; and (8) *fulvicrus*.

FIGS. 9–10. Penis valve in *Dolerus* spp. : (9) *romanus* ; and (10) *thoracicus*.

longer than the greatest breadth of the apical segment of the maxillary palp; supra-clypeal area concave above but below and on clypeal area slightly concave medially; front margin of clypeus with an excision about the size of the front ocellus; POL : OOL is as 1·0 : 0·7; POL : OO-CL as 1·0 : 0·5. *Claws* bifid; inner front tibial spur about ⅔ as long as basitarsus, and outer spur ½ as long as inner spur. *Abdomen* with 8th tergite unmodified. *Punctation:* whole insect reticulate in appearance, so densely covered in punctures that the only interspaces larger than a puncture are: one immediately adjoining each ocellus, a few in the middle of the front lobe of the mesonotum and a few on the front of the scutellum. *Pubescence* outstanding and silvery; on head and upper mesopleura about as long as diameter of front ocellus; on rest of thorax and abdomen about ½ this length. *Length* 5 mm.

PALESTINE: Shapat near Jerusalem, 1 ♂ (Holotype), 27.iii.1918 (*E. E. Austen*) (British Museum).

This species appears to be nearest to *C. andrei* Konow and *C. similis* Mocsáry and runs to the couplet containing these two species in Gussokovskii's key (1947), but in both these species the antennal club is much shorter than the 3rd and 4th antennal segments combined. *C. similis* (known from Crete, Cyprus, Syria, etc.) has very much shorter pubescence on the whole body, except on the head it is nowhere as long as ½ the diameter of the front ocellus; and the punctures on the head and thorax are much less dense with abundant shining interspaces larger than individual punctures; and it also has a longer malar space (about as long as the diameter of the front ocellus in the ♀ and about ⅘ this diameter in the ♂). *C. andrei* (Konow) (from Oran) I have not seen but it is described as having the pubescence on the head and mesonotum fuscous and the apical 3rd of the hind femur pale.

Corynis fulvicrus sp. n.

♀. Black with the following parts reddish yellow: labrum, mouthparts, suffused fleck on underside of antennal club, apical ½ of front and middle femora above, and hind femur (except for extreme base above and basal ½ below) hind tibia and tarsus (except for the apical tarsal segments which are brownish). Wings hyaline; stigma, C. and Sc. yellow; rest of venation brown.

Antenna (Fig. 8) with 3rd segment ¾ longer than 4th; 5th (club) = 3rd + 4th. *Head* with clypeus excised in front to a depth of about ¾ diameter of front ocellus; malar space very short (about as long as greatest breadth of apical segment of the maxillary palp; POL : OOL as 1·0 : 0·8; POL : OO-CL as 1·0 : 0·6. *Legs* with inner front tibial spur about ¾ as long as basitarsus; outer spur about ½ the inner spur. *Abdomen* with 8th tergite unmodified.

Punctation mostly very dense with interspaces as large as individual punctures only on clypeus, middle of supra-clypeal area, in frontal basin adjoining front ocellus and beside each lateral ocellus, middle of mesonotum and mesoscutellum, upper mesopleura, and most of 6 basal tergites. *Pubescence*, dense silvery up-standing and about as long as diameter of front ocellus, on head mesonotum and whole mesopleura. *Length* 7·5 mm.

ALGERIA: Hamman Ben Hadjar, 1 ♀ (Holotype), 31.iii.1910 (*F. D. Morice*) (British Museum); Misserghim, 1 ♀, 1929 (*Allauaud* and *Jeannell*) (Paris Museum).

Another ♀ from Algeria: Chellala, 1895 (*de Vauloger*) (Paris Museum) agrees with the above in colour and structure except that the whole punctation is sparser; the punctures on all the mesonotum (except the margins), including the scutellum, and most of the middle of the mesepisternum are separated by interspaces as large or larger than individual punctures.

TENTHREDINIDAE

SELANDRIINAE

Selandria serva fuscitarsis subsp. n.

This differs from the typical subspecies in that the 4 apical tarsal segments of the hind legs and ± middle legs are infuscate and that in the forewings the costa has little more than the basal ½ yellow and almost the apical ½ black (in the typical subspecies the basal ⅔ of the costa are yellow and only the apical ⅓ black).

CORFU: 1 ♂ (Holotype), 8.iv.1912 (*F. D. Morice*) (British Museum).

ITALY: Romagne, 2 ♂, 1 ♀, 1945 (*P. Zangheri*) (1 ♂, 1 ♀ in Zangheri Coll.; 1 ♂ in B.M.); Bologna, Gaibola, 1 ♀, 24.iv.1950 (*G. Grandi*) (in B.M.) and 1 ♀, 30.iv. 1951 (*G. Grandi*).

Strongylogaster lineata cypria subsp. n.

This form differs from the typical *S. lineata* (Christ) in that the hind femora are entirely pale yellow (instead of infuscate at base) and the two basal antennal segments are entirely black (instead of ± yellow).

CYPRUS: near Platania Forest station, 3,500–4,000 ft., 2 ♀ (including Holotype), 7.v.1945 (*G. A. Mavromoustakis*); Mt. Troodos, 5,500–6,000 ft., 1 ♀, 28.vi.1937 (*G. A. M.*) (British Museum).

Since writing this I have seen 3♀ of this subspecies from LEBANON: Falonka, 17.v.1953 (*G. A. M.*) (British Museum).

Dolerus romanus sp. n.

♂. Black; wings hyaline with black stigma and venation.

Head contracted behind the eyes; clypeus with front half inflexed along a medial transverse carina and anterior excision not so deep as half total height of clypeus; antenna about as long as vein C of forewing, 8th segment being about four times as long as its basal breadth; head densely and rather coarsely punctured above without interspaces larger than the punctures except adjoining each of the lateral ocelli and each side of the post-ocellar area which is margined laterally by a deep pit; hind ocelli nearly as far apart as the distance between an ocellus and the occipital carina (POL : OO-CL as 1·0 : 1·2); occipital furrow behind the temples and carina well developed.

Mesonotum with front lobe heavily punctured, dense at the sides with an impunctate area in front and in the middle with interspaces between the punctures larger than the punctures; lateral lobes with smaller shallow punctures spacer towards the front and sides and denser behind; scutallum flat and except for a shining sparcely punctate area in front is coarsely and very densely punctured; post-tergite of scutellum with obsolescent surface sculpture and no medial carina; mesopleura very densely and rather finely punctured above, but with the punctures thinning out below and the mesosternum is almost impunctate.

Abdomen with the 1st tergite shining and sparcely punctured, but with the other tergites densely transversely coriaceously sculptured all over except for a small medial apical bare patch on the 8th tergite; ♀ penis-valve as Fig. 9.

Pubescence very dense and grey and long on head above and the whole of the thorax, the longer hairs being about as long as 1½ the diameter of the front ocellus; abdomen with a hair patch each side of the middle line on each of the first 4 tergites, those on the 1st tergite being very long; 5th to 8th tergites clothed all over except in the middle line. *Length* 8 mm.

ITALY: Ermilia, Rivola, Fuenza, 1 ♂ (Holotype), 18.ii.1951 (*P. Zangheri*) (in the Zangheri Collection).

This most interesting new species would run to the *megapterus-asper* couplet in my recent key to the British species (Benson, 1952, p. 77) but differs from both these species and from *D. thoracicus* Fallén (cf. Figs. 9 and 10) in the form of the penis valve, in its much denser punctation on the mesonotum and base of the abdomen, and the much denser and longer pubescence on the abdomen. The penis-valve appears to be closest to that of the N. American *D. sericeus* Say but it differs from that species in almost every other character not common to all the " black " *Dolerus*, lacking, for instance, the strong tubercle on the apex of the 8th tergite, the deep excision of the clypeus and the coarse punctation of the mesopleura. In the pubescent clothing the new species resembles *D. nigratus* Müller and the possibility that it might prove to be the unknown male of the Mediterranean *D. rufotorquatus* Costa had to be considered. *D. rufotorquatus* ♀ is not known to differ in any way structurally from *D. nigratus* ♀, but it would appear that the new species is far too densely sculptured on the thorax and base of the abdomen to be the male of *D. rufotorquatus* which now appears to me to be no more than a southern race of *D. nigratus* with a red instead of black pronotum and front lobe of the mesonotum. (*Dolerus rufotorquatus* Costa = *D. nigratus rufotorquatus* **stat. nov.**).

BLENNOCAMPINAE

Athalia cuspidata sp. n.

♀. Head black except for the clypeus, labrum, mouthparts and underside of the antennae which are yellow. Thorax and abdomen yellow except for the following parts which are black: front lobes of mesonotum, a spot covering the posterior ¼ of the raised part of each of the lateral lobes, the post-tergite of the scutellum together ± with the sunken lateral parts of the metanotum, the mesosternum, the extreme apices of the front and middle tarsal segments and the sawsheath. *Wings* hyaline; stigma and apical $\frac{1}{4}$ of vein C as well as Sc + R ± piceous; rest of venation yellow.

Impunctate except only for faint hair follicles. *Head* with clypeus very short (laterally only about as long as the 2nd antennal segment) and slightly produced medially (where it is about as long as the 1st antennal segment) and sparsely pubescent; malar space less than $\frac{1}{2}$ the diameter of the front ocellus; distance between antennal sockets about the same as the distance between an antennal socket and the nearest eye margin. *Antenna* 12–13-segmented; 3rd segment greater than 4th + 5th; 6th onwards broader than long. *Legs* with tibial spurs broad and very short (inner hind tibial spur about $\frac{1}{3}$ as long as basitarsus and about $\frac{2}{3}$ as long as apical breadth of tibia); claws with a small middle tooth in addition to the end tooth. *Abdomen* with hypopygium as in *A. cordata* Lep. (see Benson, 1952, p. 82, fig. 254) and saw (Fig. 11) with prominent and sharp marginal teeth very like those of *A. cordata* (*l.c.*, fig. 252).

Pubescence on head and mesonotum long and grey but rather sparse, on the mesopleura it is evenly spread but it becomes very sparse on the mesosternum; abdomen entirely glabrous above. *Length* 6–7 mm.

♂. Coloured as in ♀ but that the whole upperside of the thorax is black (except only for the declivous parts of the mesonotum round the wing bases) and that the black spreads also from the mesosternum to cover the lower parts of the espisternum and the whole of the epimerum to the base of the wings; the metasternum and the middle of the 1st tergite are also ± infuscate.

In *structure* as in ♀ except for the sexual segments, and that the malar space is linear, that the pubescence on the thorax is much denser and covers the underthorax evenly; hypopygium entire behind.

PALESTINE: Jerusalem, 1 ♀ (Holotype) 16.iv.1943, 2 ♀, 1 ♂, 1.v.1941, 1 ♀, 7.v.1943 (*H. Bytinski-Salz*) (Holotype, 1 ♂ and 1 ♀ paratype in British Museum; 2 ♀ in Bytinski-Salz collection).

There are only 3 species of *Athalia* with toothed claws previously known (I do not regard *A. galericulata* Kontuniemi[1] as anything more than a dark form of *A. scutellariae* Cameron such as are often to be found in Britain with the typical form); and of these I can find no structural differences between the darker *A. scutellariae* (Europe) and the paler *A. flammula* Zhelochovtsev (E. Asia), so that I believe they are but races of the same species. [*Athalia galericulata* Kontuniemi, 1951 = *scutellariae* Cameron, 1880, **syn. nov.** *A. flammula* Zhelochovtsev, 1927 = *A. scutellariae flammula* Zhel. **stat. nov.**]

A. scutellariae and also *A. dimidiata* Konow (Transcaucasia) differ from the new species in their longer tibial spurs and in the form of their antennae (which have only the 9th segment onwards transverse). The new species is otherwise very similar to *A. dimidiata* in structure, having a very similar hypopygium and saw to that species, though in colour *A. dimidiata* is very different in having an entirely black thorax and 1st tergite.

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[1] Likewise *Athalia cordatoides* Kontuniemi, 1951, and *A. longifoliae* Kont., 1951, are synonyms of *A. lineolata* Lepeletier, 1823, **syn. nov.**

Athalia glabricollis meridiana subsp. n.

This subspecies differs from the typical subspecies (see Benson, 1952, p. 81) in that approximately the basal ½ of the veins C and Sc + R are yellow (instead of only about the basal ⅓) and that the mesonotum is more densely pubes cent.

PERSIA: Suva, 2 ♂, 8 ♀ (including Holotype), *Escalera Coll.* (British Museum 1900–61). TURKEY: Ockmen, 1 ♀, 12.viii.1939 (*F. S. Bodenheimer*) (Brit. Mus.); Aksehir, 1 ♂, 8.viii.1951 (*Wahrman Coll.*). PALESTINE: Jaffa, 2 ♂, 2 ♀, 24.iii.1951 (*H. Bytinski-Salz*); Jerico, 1 ♂, 3.iv.1943 (*H. B.-S.*); Jordan, Al Maghtas, 1 ♀, 24.ii.1942 (*H. B.-S.*).

Empria persephone sp. n.

♂. Black except for the following parts which are brownish white to brown: labrum, mouthparts, ± the apices of the front and middle femora, fore and lower side of front tibia and tarsus, fore side of middle tibia, ± bases of middle and hind tarsal segments, and a fleck each side of tergite 2, 3, 4, 5 and 6.

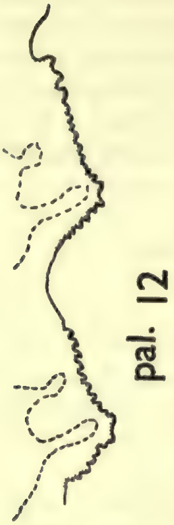
Wings infuscate; stigma and venation piceous brown.

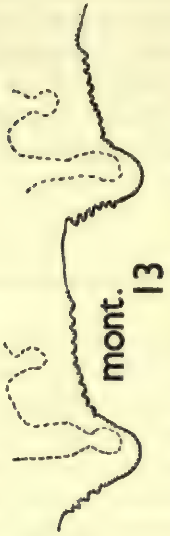
Head contracted behind eyes; the whole covered with dark pubescence (about as long as the diameter of a lateral ocellus) arising from minute tubercles surrounded by shining interspaces; occipital carina reaches from mandible almost to level of top of eyes; clypeus about as long as the distance between the hind ocelli, subtruncate in front, very slightly emarginate, with a small medial tooth continued back almost to the base of the clypeus as a longitudinal rib; eyes about ⅓ longer than broad; malar space about equal to length of 2nd antennal segment; frons as a raised platform; frontal furrow very shallow and ill-defined; hind ocelli further apart than distance of each from hind margin of head (POL : OO-CL = 1·0 : 0·8); POL : OOL as 1·0 : 1·2; postocellar area about twice as wide as long.

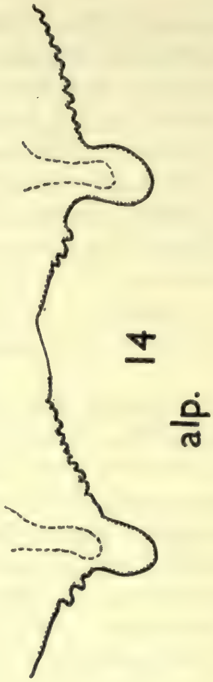
Thorax shining and impunctate though in places covered with minute tubercles; the whole with dense pubescence mainly fuscous in colour; hind tibial spurs about as long as apical width of tibia; claws with a minute medial tooth in addition to the end tooth. *Wing* venation normal, with vein m-cu missing in hind-wing. *Abdomen* with hypopygium slightly emarginate medially; penis-valve as in figure 16. *Length* 6 mm.

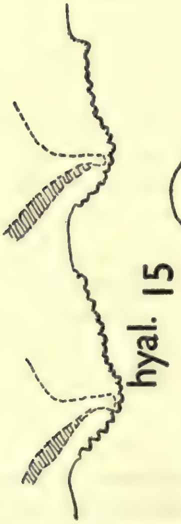
FRANCE: Var, Les Args, 1 ♂ (Holotype), 15.iv.1939 (*W. Fassnidge*) (British Museum).

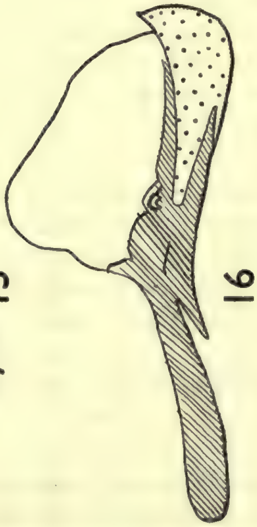
This species would run in Conde's key to European *Empria* (Conde, 1940) to *E. liturata* (Gmelin) and in my key to the British species to couplet 10 which includes *E. liturata* (Benson, 1952, p. 86–90). It differs from *E. liturata* by its infuscate wings, its very dark colour pattern, its longer antenna (in *liturata* the subapical segments are less than 3 times as long as broad), in its flat table-like frontal area, in its almost truncate clypeus and in its different penis-valve (cf. fig. 16 with fig. 275 in Benson, *l.c.*).

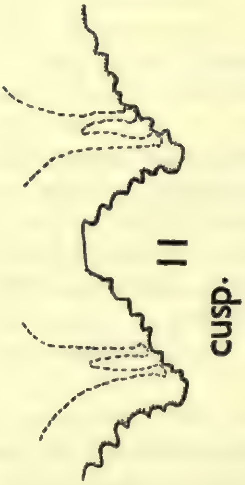












Figs. 11–15. Ninth and 10th marginal teeth of saw of: (11) *Athalia cuspidata*; (12) *Monophadnus pallescens*; (13) *M. monticola*; (14) *M. alpicola*; and (15) *Paracharactus hyalinus*.

Fig. 16. Penis valve of *Empria persephone*.

Monophadnus alpicola sp. n.

♀. Black with the following parts brown to brownish white: labrum, tegula, apices of femora of all legs, tibia of front and middle legs, and base of tibia of hind legs and ± bases of tarsal segments. Wings hyaline; stigma with the upper ½ black and the lower ½ brown; rest of venation brown.

Head swollen behind the eyes; and eyes small so that the temples in dorsal view appear as long as the eyes; genal carina short and fading out at about level of the bottom of the eyes; clypeus slightly emarginate in front and faintly punctate; malar space about ½ length of front ocellus; antenna about $\frac{8}{9}$ as long as costa of forewing, with 2nd segment about as long as broad, 3rd about ¼ longer than 4th segment, 4th–6th of almost equal length, so are 7th–9th; frontal area flat with its sides continued forwards to join, on the antennal sockets, the conspicuous supra-antennal crests which border the deep concave antennal furrow; post-ocellar area about twice as wide as long; hind ocelli about as far apart as each is from the hind margin of the head; hind orbits with a deep furrow from the top with a line of coarse irregular punctures in the furrow.

Thorax impunctate; prepectus to mesopleura absent. Wing venation and legs as in *M. pallescens* Gmelin but that the tarsal claws have each a definite middle tooth in addition to the end tooth. *Abdomen* mostly impunctate except for very faint coriaceous sculpture in places; sawsheath almost twice as long as basal plate (1·0 : 0·6), parallel-sided in dorsal view and truncate at the apex where it is about as wide as the apex of the apical tarsal segment; ovipositor about as long as 4 basal tarsal segments; saw with sharp marginal teeth (Fig. 14). *Pubescence* pale and covering whole insect including mesosternum (though it is sparser here) except for the 4 basal tergites of the abdomen which are glabrous. *Length* 4·5–6·5 mm. ♂ unknown.

SWITZERLAND: Valais, Arolla, 7,000 ft., 2 ♀ (including Holotype), 18.vi.1935, 14 ♀♀, 29.vi.1935 (*J. E. & R. B. Benson*); Les Haudères, 4–5,000 ft., 2 ♀, 6–27.vi.1935 (*J. E. & R. B. B.*).

Monophadnus, as restricted by Benson (1952, p. 97–98), includes 5 or 6 previously described species of which 3 are nearctic and 2–3 European. *M. alpicola* sp. nov. is distinguished at once from any of these species by its small eyes (so that when the head is viewed from above the length of the temple behind the eye appears about as long as the eye from that viewpoint).[1]

From *M. pallescens* Gmelin and *M. monticola* Hartig it is also distinguished by its toothed claws, by the form of the teeth on the saws (cf. Figs. 12, 13 and 14), and by the pubescent clothing of the underthorax, which in these two species is interrupted by a broad glabrous band at the junction of the mesosternum and episternum and is extremely sparse on the mesosternum. *M. semicinctus* Hartig is so different from any of the species already mentioned that it may perhaps represent a different generic group, having very short antennae (scarcely ⅔ as long as costa of forewing),

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[1] It is interesting that *Empria alpina* Benson, another high alpine sawfly we collected in Switzerland at the same time but which also occurs in arctic regions such as Lapland and the mountain tops of Scotland, likewise differs from all other species in its genus by its similarly small eyes.

an elongate 2nd antennal segment, very large eyes having very short temples behind (in dorsal view eyes about twice as long as temples behind the eyes), and an upturned apex to vein A_3 in the forewing.

Superficially the new species is very similar to *Paracharactus hyalinus* (Konow) which we collected at the same time and place as the new species. In *P. hyalinus* the pubescent clothing is the same, the eyes are not so reduced in relation to the length of the temple (in dorsal view about 1·3 : 1·0), the claws are very similar, but its elongate antennae at once distinguish it (segments 3, 4 and 5 are subequal in length) and the saws are different (cf. Figs. 14 and 15).

It would seem that the genera *Monophadnus* and *Paracharactus* (+ *Phymatoceropsis*) are extremely closely related and may even really belong to one series. The presence or absence of a prepectus to the mesopleura is not the clear-cut character that recent writers would have us think. In *Paracharactus longicornis* (Hartig) (**comb. nov.**) (= *Monophadnus longicornis* Hartig of previous authors) the prepectal furrow is reduced to a very short pit, in *P. hyalinus* it is obsolete and only indicated by an ill-defined depression, while in *Dicrostema gracilicornis* (Zaddach) the prepectus itself is reduced to a very narrow flange ; all these three were yet treated by Enslin (1912–18) as lacking a prepectus.

I characterise *Paracharactus* as follows :

Blennocampini having antennal segments 3, 4 and 5 of almost equal length, claws without a basal lobe, a post-genal carina developed on the head below, the stub to vein A_3 of the forewing simple (not bifid or turned up at apex) and with a prepectus to mesopleura ± defined.

Paracharactus longicornis (Hartig) is attached to *Helleborus* and this associaton again suggests the view that *Paracharactus* and *Monophadnus* are closely related, for *Monophadnus* is so far as is known entirely associated with Ranunculaceae.

Eutomostethus gagathinus meridionalis subsp. n.

This form differs from typical *Eutomosthethus gagathinus* (Klug) of Europe in being on the average larger (6·5–7·5 mm. : 5·5–6·5 mm.) and in that the apical antennal segment is 1½ to twice as long as the 8th segment (in *E. gagathinus gagathinus* the apical segment is about ⅓ times as long as the 8th) and the mesonotum is more densely pubescent.

CYPRUS : Chiffliccondia, near Limassol ; 3 ♂, 4 ♀, 13.iii.1946 ; 2 ♂, 3 ♀ (including Holotype), 20.iii.1946 ; 3 ♂, 5 ♀, 21.iii.1946 ; 2 ♂, 28.iii.1946 ; and 2 ♀, 31.iii.1946 (*G. A. Mavromoustakis*) (British Museum).

TENTHREDININAE

Tenthredopsis convergens sp. n.

♂. Black : except for the labrum, mandibles, 7th segment of the antenna and probably also 8th and 9th (which are missing in the type) which are white ; and except for the following parts which are reddish brown : palps, femora of all the legs, tibiae and tarsi of front and middle legs (tibia of hind legs piceous).

Wings hyaline; stigma white at the extreme base, but with the apex and the rest of the venation piceous.

Head clearly contracted behind the eyes, which are large and strongly converging in front, where they are closer together than the height of an eye (1·0 : 1·2); malar space only about as long as the width of the apical segment of the maxillary palp; clypeus subtruncate in front and slightly emarginate medially; antennal sockets moderately expanded on their inner margins (as in *T. excisa* Thomson), but the medial fovea is not deep and is separated behind from the 3-pronged frontal concavity adjoining the front ocellus; occipital carina well-developed throughout, but most prominent behind post-ocellar area and genae; POL : OOL as 1·0 : 1·8 and POL : OO-CL as 1·0 : 1·4; postocellar area about twice as broad as long and defined laterally by very deep furrows. Above, the head is smooth and almost impunctate except for the hair follicles though the genae and hind orbits are rough; and the pubescence is short and dark. *Thorax* above shining and smooth except for the follicles and except for some clear punctures on the posterior half of the mesoscutellum; mesopleura dull with coarse irregular surface puncturing. Legs normal, with basitarsus of hind legs equal to three following tarsal segments together. Wings normal, with external vein surrounding hind pair. Abdomen transversely coriaceous and evenly clothed in pubescence; 1st tergite with slight medial carina; penis valve as in *T. excisa* group (see Benson, 1952, fig. 310). Length 9·5 mm.

PALESTINE: Elon, 1 ♂ (Holotype), 16.vii.19--. (*N. Bytinski-Salz*) (in British Museum).

This species is readily distinguished at once from every other known species in the genus by its strongly converging eyes in front where they are closer together than the height of an eye and, correlated with this, by the exceptionally short malar space and the strongly narrowed head behind the eyes in dorsal aspect. On all other counts it is a typical *Tenthredopsis* and there seems no reason to erect for it a distinct genus.

Sciapteryx costalis corcyrensis subsp. n.

Differs from *S. costalis costalis* F. in the ♀ in that the whole of the inner orbits are white-margined (instead of only the upper half) and that the lower ⅓ of the outer orbits are also white-margined and that the supra-clypeal area is banded across with white; the ♂ likewise is more profusely marked with white than is *S. costalis costalis*, having the whole of the face below the eyes white (except along the post-genal carina and the tips of the mandibles), as well as a white spot on the mesapisternum.

CORFU: 1 ♂ and 1 ♀ (Holotype) (*S. S. Saunders Coll.*) (British Museum, 1886–19).

The colour pattern on the head of the new subspecies is similar to that of *S. sorror* Konow which, however, differs from all *S. costalis* not only in its black veins C and Sc + R of the forewing but also in the fact that its hindwings are as smoky in colour as its forewings (all forms of *S. costalis* have the hindwings subhyaline in contrast to the smoky forewings).

Sciapteryx cleopatra sp. n.

♀. Black with the following parts yellowish white: palps, labrum (except front margin) front ½ of clypeus (except front margin), inner orbits and lower ½ of outer orbits, front of tegula and hind margin of pronotum, line along upper side of all femora and front side of all tibiae (except apical ¼ in hind tibiae and extreme apex in the other legs), apical and lateral margins of all tergites of abdomen and apical margins of sternites. *Wings* yellowish subhyaline; basal ⅗ of stigma, C and Sc + R of forewing orange in colour; rest of venation piceous.

Head shining with very dense coarse punctures becoming rugose on frons, thinning out on post-ocellar area and temples behind the eyes where the punctures are separated by large shining interspaces. Malar space about as long as greatest width of 2nd antennal segment; POL : OOL as 1·0 : 1·4; POL = OO-CL; postocellar area about as long as its greatest breadth; postgenal and occipital carinae continued to level with top of eyes. Antenna as in *S. costalis* F.

Thorax shining between the punctures which are sparse and fine on the medial parts of the front lobes of the mesonotum, coarse and tending to fuse at sides of the lobes, dense and small on the front of the lateral lobes, becoming coarse and irregular behind, large and distinct on the front of the scutellum, smaller behind, but here the interspaces between them are densely sculptured with fine surface reticulations; mesopleura densely rugose above, shining between scattered punctures below; legs with tibial spurs short (on hind legs the inner spur is scarcely longer than the apical breadth of the tibia). *Wings* normal. *Abdomen* with transverse alutaceous sculpture above; sawsheath and saw very similar to that of *S. costalis*. *Length* 7–8 mm.

PALESTINE: Jerusalem, 1 ♀ (Holotype), 1929 (*S. Tahudhi*) " *Sciapteryx costalis* F., ♂, *det.* R. Forsius " (British Museum).

EGYPT: Alexandria, 1 ♀, 1902 (*J. de Joannis*) (Paris Museum).

This species is close to *S. costalis* but distinguishable from it at once by its subhyaline instead of smoky forewings and by its different punctation (for in *S. costalis* the whole of the mesonotum and mesopleura are dull, densely covered with small irregular punctures and with the interspaces between these punctures dull with irregular coriaceous sculpture). In *S. costalis* the malar space is also shorter (in the ♀ about as long as the greatest breadth of the 1st antennal segment). *S. cleopatra* is also much more profusely marked with white on the face of the female than is *S. costalis*, in fact it is almost as pale here as male *S. costalis* and the holotype was actually identified by Forsius as a male *S. costalis*.

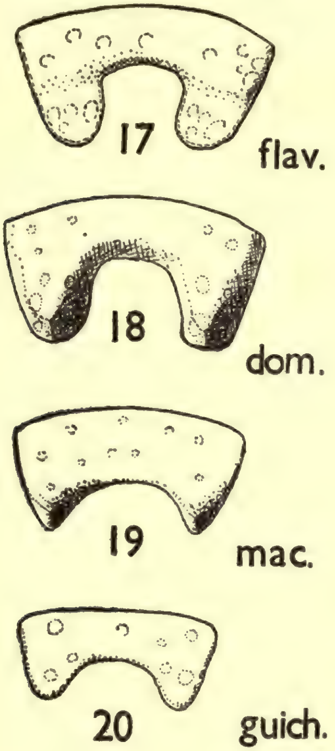
S. levantina André has its wings coloured as in *S. cleopatra* but has a different type of punctation from both species, with small regular wide-spaced punctures on the head and thorax and dense reticulate surface sculpture between.

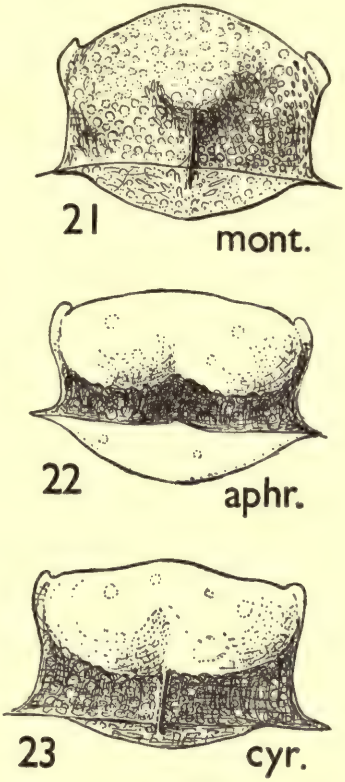
Elinora flaveola (Gmelin) and ***E. dominiquei*** (Konow)

In addition to the differences in colour and the differently shaped and segmented antennae in these two species (*flaveola* has longer and thinner 9-segmented antennae;

dominiquei has shorter more compressed and 8-segmented antennae) there are noteworthy differences in the shape of the clypeus which have not been mentioned before :

- *E. dominiquei* (Gmelin) has the front lobes of the clypeus convex with declivous sides (Fig. 18).
- *E. flaveola* (Konow) has these lobes flat and the sides as though pressed out (Fig. 17).





FIGS. 17–20. Clypeus of *Elinora* spp. : (17) *flaveola ;* (18) *dominiquei ;* (19) *maculata ;* and (20) *guichardi.*

FIGS. 21–23. Meso-scutellum of *Macrophya* spp. : (21) *montana ;* (22) *aphrodite ;* and (23) *cyrus.*

Elinora corynetes (Kirby) (comb. nov.)

Macrophya corynetes Kirby (1882) **1**: 264-5, and pl. 10, fig. 3.

Mr. K. M. Guichard collected at Jebel Soda and also at 75 km. south of Bou Ngem in Tripolitania on 2nd–4th March, 1952, a series of 16 ♀ of a species of *Elinora* very like *E. pectoralis* Kriechbaumer except that the wings are entirely hyaline (instead of yellowish) that the vein Sc + R of forewing is piceous (instead of yellow) and that the 2nd antennal segment is black. 14 of these specimens agree closely with the type specimen of *Macrophya corynetes* from Tunis and are presumed to belong to that species. Two specimens, however, taken at Jebel Soda on 2nd March in company with normal specimens differ in that the outer spur of the middle tibia has a small tooth half-way down the inner side and a flange from the tooth to the base of the spur; the spur is, in fact, modified in the same way for cleaning the antennae as the inner front spur, though to a lesser extent (cf. Figs. 27 and 28). As no other differences in these insects seem to be correlated with this form of spur it is assumed to be aberrational, but in *E. maculata* Kriech. (= *syriaca* André) and in the two new species which follow here the middle outer spur is apparently normally modified in this way like a front spur.[1] For the saw of this species compared with that of *E. caspia* and *guichardi* sp. n. see (Figs. 24–26).

Elinora saharensis sp. n.

♀. Yellowish white marked with black as follows: head above antennae (except fleck on inner orbits above and streak continuing from genae to temples behind eyes almost to vertex), antenna (except basal segment), apical segment of labial palp and basal parts of labium together with apex of mandible, margins of supraclypeal area, axis, mesonotum (except for a streak each side of front each side of front lobe) as well as whole of scutellum (except its post-tergite), metanotum (except for the post-scutellum) upper edge of mesepisternum, mesosternum and streak on mesepimerum and mesopleura, legs with a touch on the outer apex of the tibiae the apices and a line on the outer side of the tarsal segments, basal tergite (except laterally) and front part of each of the following tergites though the black thins out laterally to end before reaching the lateral edge of the segment and is smaller on each succeeding tergite so that on the 8th and 9th it occupies no more than the narrow front margin. Wings hyaline; stigma, C and Sc (i.e., front half of the fused Sc + R) yellow; rest of the venation brown except for the yellow extreme bases.

Head broadened behind the eyes and face very flat; malar space about equal to diameter of front ocellus; antenna 8-segmented with 3rd longer than 4th + 5th; clypeus (cf. Fig. 20) almost in one plane and scarcely incurved along the margins, almost glabrous and smooth except for a few coarse but shallow punctures on the lobes; frons and temples smooth between minute scattered punctures; POL : OOL as about 1·0 : 1·5. *Thorax* shining between very fine scattered punctures which, however, become thicker on lower part of mesopleura and mesosternum; outer spur on middle tibia modified as in corresponding spur on front tibia being stout with a strong tooth near the apex. *Abdomen* dull with fine transverse alutaceous surface sculpture; sawsheath and saw similar to that of *E. pectoralis.*

Pubescence white and on head and mesonotum about as long as malar space; on mesopleura longer, outstanding and apically curved, becoming adpressed on mesosternum. *Length* 10·5 mm.

SAHARA DESERT: Ahaggar Mountains, Oued Tamanrusset, 10° E., 24° N., at about 1,300 m., 1 ♀, 5.iii.1928 (Paris Museum).

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[1] Captain D. B. Baker tells me that in several species of *Eucera* as well as in some other genera of bees the middle spur is likewise modified similarly to the front spur and that this is sometimes accompanied by several modifications of the basitarsus, but I am not aware that the middle spurs are ever so modified in other Hymenoptera.

This species is extremely close to *E. coynetes* which differs in having shorter pubescence on the mesopleura (not longer than malar space), a simple or but slightly modified inner spur on the middle tibia, a slightly longer malar space and no dark colour on the sternites. It may well be that *E. saharensis* will ultimately be treated as a fourth subspecies of *E. pectoralis* together with *lindbergorum* (Forsius) (Atlas Mountains), *pectoralis* (Kriechbaumer) (Algiers), and *corynetes* (Kirby) (Tunisia and Tripolitania) ; *E. dominiquei* (Konow) (W. Europe) and *flaveola* (Gmelin) (C. and S.E. Europe) are also closely related.

E. saharensis is, however, of particular interest in that it is the first sawfly recorded from the Ahaggar Mountains, probably because so few collectors go there early enough in the year.

E. saharensis is very similar in general appearance to *E. maculata* Kriechbaumer (= *syriaca* André) which has its outer middle tibial spur modified in the same way. *E. maculata* is, however, readily distinguished by its thickened clypeus with slightly projecting anterior lobes and declivous margins (cf. Figs. 19 and 20), as well as by its slightly convex and more strongly punctured scutellum.

Elinora guichardi sp. n.

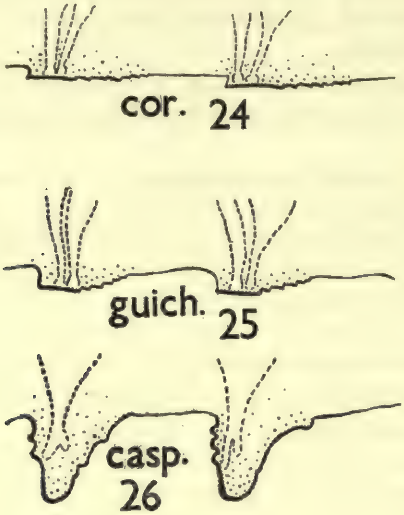
♀. Black with yellowish white on the base of the mandible, the labrum, ± a stripe on the gena, ± the tegula, and sometimes ± the 1st perapterum, an oblique streak behind on the mesepisternum and another on the metapleura ; and with reddish yellow to yellowish white in middle of mandibles, at least front of clypeus, sometimes ± basal segment of antenna, at least on hind angles of pronotum, legs (though ± infuscate throughout and at least on bases and on posterior sides of coxae, apices of tibiae and most of tarsi), hind margins of tergites laterally with the ventral portions of them entirely, together with the broad hind margins of the sternites. *Wings* hyaline ; stigma (except lower margin), C and Sc (front half of Sc + R) yellowish brown ; lower margin of stigma and rest of venation piceous. *Otherwise* as in *E. saharensis* Bens. sp. n., but that the malar space is only about as long as ½ diameter of a front ocellus, the 3rd antennal segment is about as long as the 4th + the 5th and about ½ of 6th. The inner spur of the middle tibia bears a medial inner tooth and from the tooth a flange runs to the base of the spur (cf. Figs. 27 and 28). Saw with sharp ventral teeth (Fig. 25).

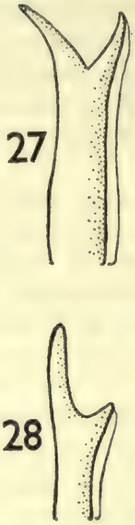
♂. *Colour* extremely variable as in ♀ and though the abdomen may be entirely black (except ± for whitish hypopygium and margins to the sternites) it may be ± reddish yellow to entirely reddish yellow and in the palest forms the reddish yellow spreads over the 4th and 5th tergites at least posteriorly, and sometimes even across the posterior margins of the other tergites also. Wings as in ♀.

Structure, except for sexual segments, as in ♀ ; but the malar space is very short (only about ⅓ diameter of front ocellus) and in one of the males (out of 8 ♂) the inner tibial spur is un-modified. *Length* 7–9·5 mm.

TRIPOLITANIA : 75 km. south of Bou Ngem, 2 ♀ (including Holotype), and 1 ♂ (with simple middle tibial spurs), 4.ii.1952 (*K. M. Guichard*) (British Museum) ; Jebel Soda (Wadi Ghodaifa), 5 ♂, 3.iii.1952 (*K. M. G.*) ; Wadi Tonzist (51 miles south of Bou Ngem), 1 ♂, 8.iii.1952 (*K. M. G.*).

Structurally this very variable species appears to be closest to *E. corynetes* which is distinguished from it, however, by having a longer malar space (about as long as front ocellus in ♀) and a saw with teeth that are much less sharp and prominent (cf. Figs. 24–26).





FIGS. 24–26. Ninth and 10th marginal teeth of saw in *Elinora* spp.: (24) *corynetes*; (25) *guichardi*; and (26) *caspia*.

FIGS. 27–28. Inner tibial spurs of *Elinora guichardi*: (27) foreleg; and (28) middle leg.

Rhogogaster arctica Kiaer.

Dr. E. Enslin has most kindly presented to the British Museum (Natural History) 1 ♀ *Rhogogaster arctica* Kiaer which he collected himself in the Frankische Jura of Bavaria, on 2.vii.1933; this species was previously only known from arctic and subarctic Europe and is therefore an addition to the known fauna of Central Europe. Superficially it is very like *Pachyprotasis rapae* L., but that the antennae are shorter with the 3rd segment about 1½ times as long as the 4th, the stigma of the forewing is pale, and, of course, except for the generic characters, the flatter and more broadly emarginate labrum, and the tibia longer than the femur and with shorter spurs.

Macrophya orientalis Mocsáry (stat. nov.) and *M. rufipes* (L.).

Macrophya rufipes var. *orientalis* Mocsáry, 1891, p. 156.

Mocsáry described this form as a variety of *M. rufipes* L. differing from the typical form in having an entirely black abdomen instead of one banded with red. A series in the British Museum from S.W. PERSIA, B.M. 1900–61 (*Escalera Coll.*) evidently belonging to the form described by Mocsáry differs so markedly from *M. rufipes* in sculpture as to indicate that the two belong to different species, distinguishable as follows :

M. orientalis Mocsáry. Head with strong and dense punctures on the frontal area which become finer on the inner orbits ; the surface between the punctures is shining. Abdomen black with lateral flecks on 6th and 7th tergites, dull above with dense transverse striae, and the pubescence sparse and very short. Wings smoky. Inner hind tibial spur shorter (spur : basitarsus as 1·0 : 1·8).

M. rufipes (L.). Head shining between shallow setiferous punctures, the punctures becoming smaller and sparser on the orbits and temples. Abdomen black with ± reddish yellow band on the 3rd and 4th tergites, and in ♀ with a large lateral fleck on each side of the 6th tergite, a smaller one on each side of the 7th and on the middle of the 9th, shining above without surface sculpture between the follicles and the adpressed hairs from these follicles are longer than the distance between them so that they overlap. Wings yellowish hyaline. Inner hind tibial spurs very long (spur : basitarsus as 1·0 : 1·4).

Macrophya aphrodite sp. n.

♀. Black with the following parts yellow : mouthparts, labrum, clypeus, hind angles of pronotum, tegula, meso-scutellum (except hind margin), and its post-tergite, fleck on mesopleura, legs (except for black hind coxae, bases of fore and middle coxae, apical $\frac{1}{3}$ of hind femur ; and brownish extreme apices of fore and middle tibia and tarsal segments ; and for reddish brown hind tibia and tarsus) ; 1st tergite of abdomen almost entirely, 3rd, 4th, 5th and 6th tergites each with a lateral fleck each side increasing in size progressively so that on the 6th the flecks almost meet dorsally, 7th with a small lateral fleck and 9th entirely. Wings yellowish hyaline ; venation piceous though the lower part of the disc of the stigma is brown.

Head with malar space very short (only about $\frac{1}{3}$ the transverse diameter of the front ocellus), densely punctured on frons, orbits, vertex and genae, with interspaces alutaceous and smaller than the punctures ; on temples the punctures are much sparser so that the interspaces are in places larger than the punctures and with the surface smooth and shining. *Thorax* : mesonotum very thickly covered with small punctures dull with alutaceous sculpture between ; scutellum (fig. 22) in front tumid and shining, with sparse punctures, but with the posterior quarter depressed and densely punctured and without a medial keel ; post-tergite about as long as the width of a cencher, and shining with only 2 or 3 vague punctures and no medial keel ; under-thorax with dense fine punctures and a few scattered interspaces larger than punctures and with alutaceous surface sculpture. *Legs* with hind tibia about as long as hind tarsus ; basitarsus longer than following tarsal segments (as about 1·2 : 1·0) ; inner hind tibial spur more than $\frac{1}{2}$ as long as basitarsus (as about 1·0 : 1·6). *Fore wing* : anal cell with very short cross vein in the middle. *Abdomen* with dense transverse alutaceous sculpture ; saw not distinguished from that of *M. montana.*

♂. *Coloured* as in ♀ but that the front and middle coxae are black only at the extreme apex and the hind coxae are only black above on the basal $\frac{2}{3}$, the hind tibia and tarsus are on the other hand entirely black (except for a yellow apical outer spot on the tibia, and on the basitarsus, and for the mainly yellow 2nd and 3rd tarsal segments), that the yellow flecks on the abdomen are smaller (that on the 1st tergite is medially contracted and the 9th tergite is only yellow at the extreme apex), *Structurally* as in ♀ except for the sexual segments and that the malar space is linear. *Length* ♀ 10–11·5 mm. ; ♂ 9·5–10·5 mm.

CYPRUS : Episcopi, 7 ♀ (including Holotype), 9 ♂, 14–30.v.1937 (*G. A. Mavromoustakis*) ; Platus, 1 ♂, 19.vi.1937 (*G. A. M.*) ; and Platus, 3,800 ft., 1 ♀, 10.viii. 1937 (*G. A. M.*).

This species is apparently most closely related to *M. montana* Scopoli which it much resembles in colour ; but the stigma is brown instead of piceous and in the ♀ the hind tibia and tarsus are reddish brown instead of being black with yellow flecks (as they are, however, in its ♂). In sculpture the head of the new species is far more densely and finely punctate all over (though not so densely and finely punctate as is *M. postica* Brullé). The scutellun (Fig. 22), however, is different in form, being tumid and smooth and almost impunctate in front, without a medial keel behind or on the post-tergite (in *M. montana* it is flatter and dull, with numerous punctures except on the front ⅓, and there is a medial keel over the posterior ⅓ and continued across the anterior 3rd of the post-tergite (Fig. 21)).

Macrophya cyrus sp. n.

♀. Black with the following parts yellow : mouthparts, labrum, clypeus, ± 1st, 2nd, and base of 3rd antennal segments, hind angles of pronotum, tegula, meso-scutellum (except hind margin and post-tergite), fleck on mesopleura, legs (except coxae and ± femora especially inner side of hind pair, but that on the hind legs the yellow colour has an orange tinge, and the tibia and tarsal segments are brown at their apices), 1st tergite of the abdomen almost entirely, broad apical margins of 3rd to 9th tergites (broken medially on the 3rd and 4th, and laterally on 7th and 8th), also ± medial apical flecks and narrow apical margins of sternites except hypopygium. *Wings* subhyaline with the forewings slightly infuscate apically (the infuscation occupies cell $3R_1$ and ± overflows the margins of the surrounding cells) ; stigma, C, Sc and anal veins of forewing yellow ; rest of venation brown to piceous.

Head with frons and area beside ocelli heavily punctures though with interspaces as large as punctures, giving way to shining and parsely punctured lower face, orbits and temples with a large impunctate area each side of post-ocellar region, the interspaces and impunctate areas being without surface sculpture byeond the hair follicles ; malar space very short (about ⅙ diameter of front ocellus). *Thorax* with mesonotum and mesopleura heavily punctured and with coriaceous sculpture on the interspaces which are in places as large as the punctures ; meso-scutellum (Fig. 23) with anterior ⅔ tumid, rounded and almost impunctate ; while the posterior ⅓ and post-tergite are dull with dense coarse punctures and coriaceous sculpture between the punctures, and are transected by a sharp medial longitudinal keel ; the post-tergite is extremely short (only about ½ width of a cencher). *Fore wings* with the anal cell constricted medially for about as long as is the greatest width of the apical portion of the cell.

Abdomen and *legs* as in *M. aphrodite*, but that the saw has very acute marginal teeth.

♂. *Coloured* as in ♀ but that the fore and middle legs are entirely pale and the hind femora are only black on the inner side, though the hind tibia may be ± infuscate below as well as on the inner side, and on the abdomen the 1st and 3rd–6th tergites and all the sternites together with the hypopygium are yellow (except at the extreme bases, and the 3rd and 4th tergites medially). *Structurally* as in ♀ except for the sexual segments and that the malar space is linear. Length ♀ 10–11 mm.; ♂ 8·5–10·5 mm.

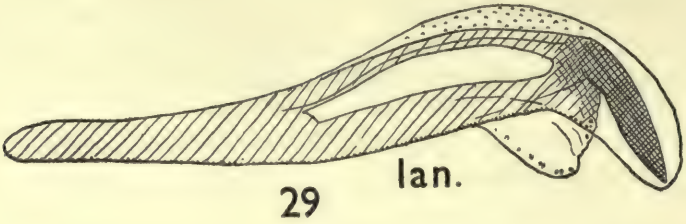
S.W. PERSIA: K. Sefid, 6 ♀ (including Holotype), 10 ♂; and Bazuft, 2 ♀, 2 ♂. (*Escalera Coll.*) (British Museum 1900–61).

This species belongs to the same group as the preceding but forms a sub-group, distinguished by the yellow stigma, C and Sc of forewing, together with *M. postica* Brullé, *M. superba* Tischbein and *M. ottomana* Mocsáry all occurring in S.E. Europe and the E. Mediterranean. It is closest to *M. superba* with which it agrees in general colour and sculpture including details of the mesoscutellum and its abnormally short post-tergite. It differs, however, in its wings being subhyaline with apical infuscations (uniformly yellowish hyaline in *superba*) in its much shorter malar space in the ♀ ($\frac{1}{6}$ diameter of front ocellus instead of $\frac{1}{3}$) and in the constriction of the anal cell of the forewing (*superba* has a short cross-vein). *M. postica* has much denser punctation on the head with the interspaces coriaceous, a scutellum as in *M. aphrodite* Benson sp. n. (see above), uniformly yellowish hyaline wings with but a narrow constriction of the anal cell of the forewing and a saw with blunt marginal teeth. *M. ottomana* (if I have correctly interpreted this species) was represented by 1 ♂ in the Escalera Collection from S.W. Persia, K. Sefid, which agrees well with the original description of this species so far as that goes; it differs from the new species in having a scutellum like that already described above for *M. aphrodite*, with a normal post-tergite (cf. Figs 22 and 23), wings coloured as in *M. cyrus* but with anal cell constricted for only a short way (as in *M. postica*), a head with denser punctation (as in *M. postica*), but without microsculpture between the punctures, antennae entirely black, hind femur with basal $\frac{1}{2}$ yellow and apical $\frac{1}{2}$ black on both outer and inner sides and abdomen with much less extensive yellow colouring as follows: a yellow lateral fleck each side joined by a narrow apical margin on the 1st tergite, lateral flecks on the 3rd to 7th tergites (those on the 5th and 6th being much larger than the others but still interrupted medially), and the apex of the last tergite; while the hypopygium and sternites are black.

NEMATINAE

Cladius ordubadensis Konow (species revocata)

Mr. Mavromoustakis has taken in Cyprus a long series of this form which was originally described by Konow (1891, p. 211–12) from the Caucasus and is known also in the Crimea. In this series there is scarcely any variation in the structure of the male or female antennae or deviation from Konow's description; and Zhelochovtsev's view (1952) that this species, together with *C. difformis* Panzer and *C. comari* Stein, are but forms of *C. pectinicornis* Geoffroy is not acceptable without much stronger evidence.



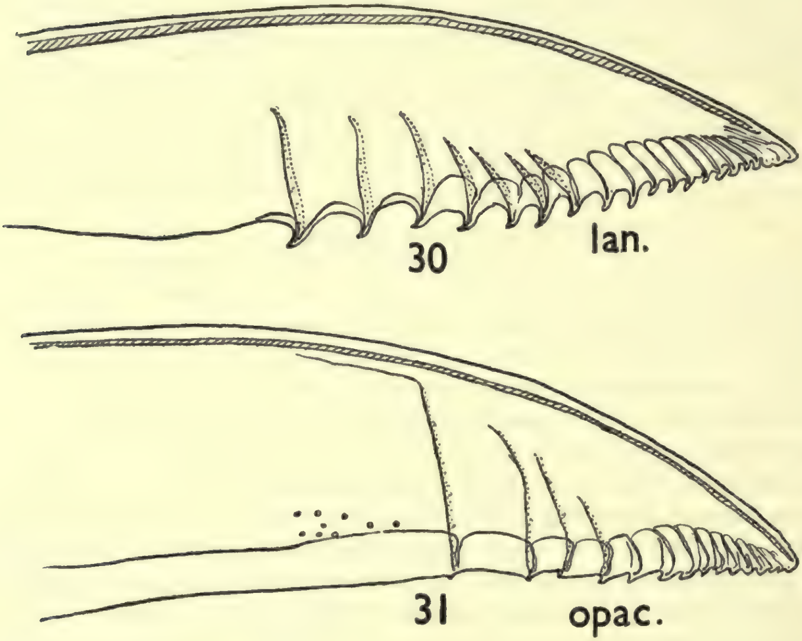


FIG. 29. Penis valve of *Mesoneura lanigera*.

FIGS. 30–31. Saw of *Mesoneura* spp. with the clothing of flattened pubescence omitted : (30) *lanigera* and (31) *opaca*.

Mesoneura lanigera sp. n.

♀. Yellowish brown with the following parts black or piceous : head above clypeus (except for the supra-clypeal area), antennae, axis, a broken vitta on each lateral lobe of the mesonotum, suture beside the mesoscutellum, mesosternum, sunken and lateral parts of the metanotum, bases of coxae and extreme base of front and middle femora, ± apex of hind tibia and hind tarsus, sternites and sawsheath of abdomen. Wings hyaline ; stigma, C and Sc (i.e, front half of Sc + R) yellow, rest of venation piceous.

Pubescence : head and thorax covered with dense woolly pubescence, much of it as long as the long inner spur on the fore tibia, and yellowish white in colour. *Abdomen* with long woolly pubescence below but this is very short and sparse above.

Punctation : head and thorax smooth and shining except for the fine surface follicles ; abdomen above with dense alutaceous surface and transverse striae.

Head with malar space linear ; clypeus medially excised in front to about $\frac{1}{3}$ its total length ; frontal area slightly concave and carinate laterally, but with the frontal basin confluent in front with the deep antennal groove ; POL : OOL as 1·0 : 0·7 ; POL : OO-CL as about 1·0 : 0·8 ; postocellar area defined laterally with short deep pits. *Antenna* almost as long as C of forewing ; 3rd segment a little shorter than 4th and obliquely truncate apically ; 4th–5th ; 6th onwards progressively shorter.

Thorax, wing venation and *abdomen* as in *Mesoneura opaca* F., but inner hind tibial spur about as long as apical width of tibia, sawsheath broadly emarginate behind —about as broad as the apex of the hind femur and saw with more marginal teeth (cf. Figs. 30 and 31).

♂. Black with the following parts yellowish white : mouthparts, base of mandibles, labrum, front $\frac{1}{2}$ of clypeus, prothorax, tegulae, ± trochanters, apical $\frac{1}{2}$ of front and middle femora, and hind femur (except extreme base and a line beneath basal $\frac{1}{2}$), tibiae (except apex of hind pair), fore and middle tarsi, and 2nd, 3rd and 4th tergites and front of 5th. Otherwise as in ♀ except for sexual segments ; hypopygium broadly truncate at apex, very slightly emarginate medially ; penis valve (Fig. 29). Length 7–8 mm.

CYPRUS : Pera Pedi, 2,000 ft., 3 ♀ (including Holotype), 4.iv.1952 (*G. A. Mavromoustakis* ; Potamitissa, 3,000 ft., 1 ♂, 25–26.iii.1944 (*G. A. M.*) (in British Museum).

Mr. Mavromoustakis tells me, in a letter dated 19.iii.1953, that these specimens were all captured at flowers of *Quercus infectoria* Oliv., which is probably the foodplant as the genus is associated so far as is known entirely with *Quercus*.

This new species can be distinguished from *M. opaca* F. by the pale colour of the abdomen in the ♀, by the saws (cf. Figs 30 and 31), and by the long woolly golden pubescence on the head and thorax in both sexes ; in *M. opaca* this pubescence is nowhere as long as the inner front tibial spur. The colour pattern and pubescence would serve also to distinguish the new species from the two other described species in the genus, *M. arquata* Klug (C. Europe) and *M. macroptera* Takeuchi (Japan), but no male of any species in the genus has been found before.

SAWFLIES OF CYPRUS

CEPHIDAE.

Syrista parreyssi Spinola. (S. Europe and E. Mediterranean to Caucasus.) Mt. Troodos, Krios River, 5 ♂, 1 ♀, 15–20. vi.1937. Platus, 3,800 ft., 1 ♂, 3 ♀, 5–12.vii.1937.

Pachycephus smyrnensis J. P. F. Stein. (Balkans and E. Mediterranean.) Amathus, Kyrenia, Larnaca and Limassol, iii–iv.1931–5.

Trachelus armenius (Konow). (E. Mediterranean.) Amathus, Larnaka, Limassol, Mesagitonia and Yermasogia, iii–iv.1935–46.

T. tabidus (F.) (C. Europe and Mediterranean to Caucasus.) Amathus, Limassol, Mesagitonia and Yermasogia, iii–iv.1935.

Calameuta idolon (Rossi). (Mediterranaean to Caucasus.) Fasoulla, 400–500 ft., 8 ♂, 8 ♀, iii–iv.1940, on flowers of *Sinapis*.

C. festiva Benson sp. n. (Cyprus.) Yerasa, 1,000 ft., 1 ♀, 2.iv.1945.

SIRICIDAE.

Urocerus gigas gigas L. (W. Palaearctic.) Limassol, 1 ♀, iv.1932.

Sirex noctilio F. (Holarctic.) 5 ♂, 3 ♀, 25.x.1927, H. M. Morris. *ex* pine log.

ARGIDAE

Arge ochropus Gmel. (Mediterranean and Europe to C. Asia.) Platus, 3,800 ft., 2 ♀, 20.vi.1937; Pera Pedi, 2,000 ft., 1 ♂, 18.vi.1937; Kykko, 2 ♂, 1 ♀, 15–17.vii.1939 (*H. Lindberg*).

A. cyanocrocea syriaca (Mocsáry). (Asia Minor.) Amathus, 1 ♂, 23.iii.1935; Kato Amiandos, 3,500 ft., iv.1946; Platus, 3,800 ft., 2 ♀, 3 ♂, 10.vi.1937; Mt. Troodos, Krios River, 4,500–5,000 ft., 3 ♂, 1 ♀, 15–17.vi.1937; Yermasogia, 4 ♂, 12.iii–28.iv.1935; Yersa, 1,000–1,200 ft., iii–iv.1945–47; Galata, 1 ♂, 15–21.vi.1939 (*H. Lindberg*).

A. nigritarsis Klug. (E. Mediterranean to N. Persia.) Limassol, 1 ♂, 1♀, 10–17.iii.1931; Platus, 3,800 ft., 18 ♂, 6 ♀, 11–19.vi.1937; Pera Pedi, 4,000 ft., 1 ♀, 18.vi.1937; Mt. Troodos, Krios R., 4,500–5,000 ft., 4 ♂, 2 ♀, 15.vi.1937; Yermasogia, 4 ♀, 13–14.iii.1935.

A. proxima André. (E. Mediterranean to Turkmen.) Mandria, 2 ♀, 16.vi.1937; Pera Pedi, 2,500 ft., 7 ♂, 7 ♀, 18.vi.1937; Platus, 3,800 ft., 11 ♂, 6 ♀, 11–19.vi.1937; Mt. Troodos, Krios R., 4,500–5,000 ft., 10 ♂, 16–17.vi.1937; Kykko, 2 ♂, 3 ♀, 15–17.vii.1939 (*H. Lindberg*).

CIMBICIDAE.

Corynis similis (Mocsáry). (E. Mediterranean.) Amathus and Limassol, iii–iv.1931–35.

TENTHREDINIDAE

SELANDRIINAE

Strongylogaster lineata cypria Benson subsp. n. (Cyprus.) Near Platonia Forest Station, 3,500–4,000 ft., 2 ♀, 7.v.1945; Mt. Troodos, 5,500–6,000 ft., 1 ♀, 28.vi.1937.

Blennocampinae.

Athalia cordata Lepeletier. (W. Palaearctic.) Limassol and Mesagitomia, xii.1934–iii.1935; Mt. Koznos, 2,500 ft., 3.vi.1936; Kato, Amiandos, 3,500 ft., 4.iv.1946.

Allantus balteatus Klug. (C. Europe and Mediterranean.) Amathus, Limassol, Mesagitomia, Sphalogiotissa, Yesmasogia, xi–iv and vii.1933–35.

Empria archangelskii Dovnar-Zapolski. (E. Mediterranean to Caucasus.) Koznos Mts., 2,500 ft., iii.1936; and Ayia, Izini R., 7 miles from Limassol, 1 ♂, 1 ♀, 25.xii.1947.

Eutomostethus gagathinus meridionalis Benson subsp. n. (Cyprus.) Chifliccondia, nr. Limassol, 13–31.iii.1946; Akrotiri Bay, 2 ♂, 1 ♀, 26.iii.1947.

Tenthredininae

Macrophya aphrodite Benson sp. n. (Cyprus.) Episcopi and Platus, iv–v.1937. Platus, 3,800 ft., 1 ♂, 19.vi.1937, 1 ♀, 10.vii.1937.

Nematinae

Cladius ordubadensis Konow. (E. Mediterranean to Caucasus.) Limassol, Mesagitomia, Sphalagiotisa, and Yermasagia, xi–vii.

Mesoneura lanigera Benson sp. n. (Cyprus.) Pera Pedi, 2,000 ft., 3 ♀, 4.iv.1952; Potamitissa 3,000 ft., 1 ♂, 25–26.iii.1944.

Nematus lucidus Panzer. (Palaearctic.) Kellaki, 2,000 ft., 1 ♀, 28.iii.1952; Pera Pedi, 2,000 ft., 1 ♀, 4.vi.1952.

Pristiphora ? sp., near *biscalis* Förster. Pera Pedi, 2,000 ft., 1 ♀, 4.iv.1952.

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VON
HANS JOHN
(Bad Nauheim)

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NEUE NOTIOPHYGIDAE (COLEOPTERA)

Von Hans JOHN

(Bad Nauheim)

SYNOPSIS.

New Notiophygidae.

The paper is based mainly on material collected in South Africa by R. E. Turner, and in Ceylon and the Far East by Dr. M. Cameron and R. V. de Salvaza.

Two new genera, *Pondonatus* from S. Africa and *Profallia* from Singapore, are described, each with one new species.

Six new species of *Aphanocephalus* and four of *Cephalophanus* are also described and figured.

The holotypes of the new species are in the British Museum (N.H.), with the exception of *Aphanocephalus pseudatomus* and *A. tonkinensis*, which are represented by paratypes, the holotypes being deposited in the Paris Museum.

Eine Sendung Notiophygidae aus den nicht determinierten Beständen des Britischen Museums in London ergab eine solche Fülle wenig bekannter und neuer Spezies, dass es geboten erscheint, die Ergebnisse zusammenzufassen und gemeinsam zu besprechen. Für die freundliche Bereitstellung des Materials und seine Aussonderung spreche ich Mr. E. B. Britton und Miss C. M. F. von Hayek meinen verbindlichsten Dank aus.

Die Familie der Notiophygidae (= Discolomidae) umfasst bisher 13 Gattungen, von denen nur bei *Notiophygus*, *Aphanocephalus* und *Discoloma* Spezies in grösserer Zahl bekannt geworden sind. Aber auch diese waren meist auf Grund weniger oder einzeln vorliegender Exemplare determiniert worden, wobei die körperlich grösseren, 7 bis 8 mm. messenden Gattungen sich in der Vereinzelung ihres Auftretens nicht von den kleinen, 1 bis 3 mm. messenden unterscheiden. Um so aufschlussreicher war daher die vorgelegte Kollektion, welche von einigen Spezies verschiedener Gattungen ganze Reihen enthielt. Es darf daher angenommen werden, dass für die Zahl der erbeuteten Tiere nicht ihre Seltenheit, sondern die Methode des Sammelns ausschlaggebend ist. Hier möchte ich nicht unterlassen, dankbar die Namen der Herren R. E. Turner, R. V. de Salvaza und Dr. Cameron zu erwähnen. Leider fehlen noch fast alle Beobachtungen über die Lebensweise der Tiere und Larven sind bisher erst von zwei Gattungen bekannt geworden, (Fritz van Emden, *Zool. Anz.* **101** (1/2), 1932 : *Discoloma cassideum* Reitter und *Arb. morph. tax. Ent.* **5** (2), 1938 : *Notiophygus hessei* John).

Die Zugehörigkeit fraglicher Käfer zur Familie kann ganz kurz dahin beantwortet werden, dass Notiophygidae an allen Beinen drei Tarsen und dazu drei Paar gleichgestaltete kugelige Hüften haben. Durch die kugeligen Hüften sind sie auch leicht von denjenigen Colydiidae zu trennen, welche ebenfalls nur 3 Tarsen besitzen. Denn die Erwartung Horns (*Fauna Hawaii.* **3** (5) : 431 1908), dass möglicherweise Gattungen mit kugeligen Hüften, wie *Discoloma*, aber tetrameren Tarsen und anders gebildeter Fühlerkeule als Übergänge zu den Colydiidae gefunden werden könnten, hat sich bisher nicht erfüllt. Nach Untersuchungen über die anatomischen Unterschiede der Colydiidae und Notiophygidae sind solche Übergänge auch nicht zu erwarten. Dagegen ist anzunehmen, dass nicht nur die Spezieszahl überall noch erheblich steigen wird, sondern dass auch noch neue Gattungen auftreten werden. Denn Gebiete wie Südamerika und Australien, aber auch die weiter von der Küste entfernten Länder Asiens sind in dieser Hinsicht noch nicht erschlossen. Daher sei schon hier gesagt, dass in der vorgelegten Kollektion auch 2 neue Gattungen gefunden wurden. Im Übrigen verteilt sich das Material recht ungleichmässig auf folgende Gattungen : *Notiophygus* Gory, *Discoloma* Er., *Cassidoloma* Kolbe, *Parafallia* Arr., *Aphanocephalus* Woll. und *Cephalophanus* John.

Notiophygus Gory

N. canus John, *Arb. morph. taxon. Ent.*, Berl. 2.1.1935, p. 16 und 5.2.1938, p. 130.

Die Spezies wurde auf Grund eines ♂ Exemplars festgelegt (Typus im Britischen Museum). Später wurden 6 Exemplare und jetzt 48 Exemplare determiniert, die alle am gleichen Ort (Mossel Bay, C. P.) von R. E. Turner gesammelt waren. Abbildungen : l.c.

Discoloma Erichson

D. sancatarinae John, *Beiträge Ent.* (Bln-Friedrichshagen), 2.6.1952, p. 618.

Die Spezies wurde nach 8 Exemplaren, leg. Lüderwald, Fundort S. Catarina, Brasilien, determiniert (Typus ♂♀ und Paratypen im Deutsch. Ent. Inst.). Material : 1♂, nicht ganz ausgefärbt, im Britischen Museum, leg. Plaumann, S. Catharina (!), Nova Teutonia. Abbildungen : l.c.

Cassidoloma Kolbe

Ct. hymaloides Reitter, *Dtsch. ent. Z.* **22**, 1878, p. 125 (***Discoloma***).

Material : 1 Exemplar leg. L. Burgeon, Fundort : Haut Uelle, Moto, im Britischen Museum. Abbildungen : *Arb. morph. taxon. Ent.*, Berl. 7, 4, 1940, Taf. 7 und 8.

Parafallia Arrow

P. simoni John (*Ann. Mag. nat. Hist.* (12) **5**, 1952 ; 156).

Die Spezies wurde nach 4 Exemplaren der Coll. Grouvelle des Pariser Museums beschrieben. (Typen im Pariser Museum, Paratypen im Deutschen Entomologischen Institut). Vom Britischen Museum wurden vorgelegt :

12 Exemplare aus Ceylon, Colombo und 19 Exemplare aus Singapore, leg. Dr.

Cameron, Nov./Dez., 1915, welche zu einigen Ergänzungen der Beschreibung Veranlassung geben.

Auf p. 157 l.c. heisst es : . . . die 2. Pore(des Pronotums) liegt dicht an der Leiste auf einer schmalen ovalen Fläche. Die Befunde an 31 Exemplaren ergaben : Die 2. Pore liegt frei neben der Randleiste, oft ist ihr Rand etwas verbreitert und bildet einen flachen Ring, seltener ist dieser Ring zu einer kleinen Fläche verbreitert, welche zum Discus hin rund, zum Seitenrand hin spitz ausgebildet ist, ohne mit der Randleiste zu verschmelzen. Diese letzte Form wurde unter 12 Tieren aus Colombo 3 mal, unter 19 Exemplaren aus Singapore 1 mal beobachtet. Die Reihe aus Colombo umfasst Grössen von 1·1 × 0·9 mm. bis 1·3 × 1·05 mm. Die Serie aus Singapore umfasst Grössen von 1 × 0·85 mm. bis 1·2 × 1 mm. Von beiden Reihen wurden identische Penisse präpariert. Abbildungen : Taf. 17, fig. 1*a*-1*c*.

Ein Exemplar trägt einen Zettel mit einem Hinweis auf die Lebensweise : "Fruit of Jaradaga".

Neue Spezies von *Aphanocephalus* Wollaston

Über die von Wollaston (1873) in *Ent. Mon. Mag.* aufgestellte Gattung haben verschiedene Autoren gearbeitet, zuletzt Grouvelle (*Notes Leyden Mus.* **34** (2) 1912.). Dabei wurden eine Anzahl Spezies dieser Gattung zugeschrieben, welche nicht dorthin gehören. Auf Grund von Material aus dem Britischen und Pariser Museum konnte ich die Verhältnisse klar stellen und die Ergebnisse in einer " Revision der Gattung *Aphanocephalus* " niederlegen, welche zurzeit noch nicht gedruckt vorliegt. Soweit Spezies der Gattung *Parafallia* Arrow zuzuweisen waren, habe ich dies in der "*Parafallia*-Studie " *Ann. Mag. nat. Hist.* (12) 5, 1952, p. 152 erwähnt. Die hier aufgeführten neuen Spezies von *Aphanocephalus* sind in Art der Beschreibung der " Revision " angeglichen.

Aphanocephalus pseudatomus sp. n.

Die Spezies wurde auf Grund von 4 Exemplaren aus dem Besitz des Pariser Museums aufgestellt, eine Beschreibung aber bisher nicht veröffentlicht. Die jetzt in Anzahl aus dem Besitz des Britischen Museums vorliegenden Exemplare, welche R. V. de Salvaza an gleicher Örtlichkeit sammelte wie A. de Cooman, gaben die Möglichkeit, die Geschlechter zu trennen.

Kurz behaart. Die Spezies ist in Grösse und Färbung *atomus* Grouvelle sehr ähnlich doch durch die stärkere Ausbildung der Seitenränder und die viel kräftigere, Punktierung, besonders der Elytren, sehr gut von ihr zu trennen. *Pseudatomus* ist etwas breiter im Umriss und die Basis des Pronotums ist stärker konvex als bei *atomus*. Zudem ist die Partie an den Vorderecken nur etwas rötlich transparent, im ganzen aber dunkel, nicht farbig aufgehellt wie bei *atomus*. Die Punktierung des Pronotums ist ziemlich kräftig, die der Elytren noch stärker und die Pseudoporen treten besonders im Basalteil oft zu Gruppen zusammen. Die Behaarung der Oberfläche ist etwa dreimal länger als bei *atomus*. In der Mitte der Elytren befindet sich ein rundlicher rotbrauner Fleck mit verschwommenen Rändern. Die Randleiste ist kräftig entwickelt, in ihrer Fläche schräg liegend und lässt die

Tuberkelporen besonders im Basalteil deutlich sehen. Die Spezies gehört zu den Formen, deren Penis distal nicht in zwei seitliche Teile gespalten ist und deren Peniszunge an Stelle einer distalen Verbreiterung spitz geformt ist und eine herausstreckbare chitinisierte Röhre als Führung des sac intern besitzt (Vergl. *austerus* John, *Ent. Bl.* **37** (5/6), 1941, Taf. 8, fig. 10). Grösse: 1·7 × 1·3 mm. Material: Typen und 2 Paratypen im Pariser Museum, 7 Paratypen im Deutschen Entomologischen Institut, 19 Paratypen im Londoner Museum. Fundort: Tonkin, Hoa Binh, leg. A. de Cooman und R. V. de Salvaza. Abbildungen: Taf. 14, fig. 2–6 (*atomus* Grouvelle, fig. 7).

Aphanocephalus tonkinensis sp. n.

Kurz behaart, von ovaler Umrissform, glänzend dunkelbraun bis rotbraun, das Pronotum im ganzen etwas heller. Die Elytren haben einen breiten Seitenrand, der sich aber zur Spitze hin stark verschmälert. Die leicht erhöhten Porenöffnungen der Tuberkel sind gut sichtbar. Die Punktierung des Pronotums ist von mittlerer Feinheit, die der Elytren lässt sehr deutlich zwei Formen erkennen, die zarteren Punkte, aus denen die Haare entspringen und die Pseudoporen, welche wesentlich grösser, über die ganze Fläche verteilt, aber im Basalteil besonders gross und häufig sind. Die Behaarung ist sehr fein und kurz und scheint allgemein auf den Elytren noch schwächer zu sein als auf dem Pronotum. Die Unterseite ist dunkel, das "1." Sternit ist gleichmässig grob punktiert, die übrigen dagegen feiner. Der Penis ist weichhäutig, einfach gebaut, die Zunge (Einlage) ist fast ⅓ länger als der Peniskörper und am Ende breit abgerundet. Grösse: 1·5 × 1·05 mm. Material: Typen ♂♀ und 21 Paratypen im Pariser Museum, 2 Paratypen im Britischen Museum, 6 Paratypen im Deutschen Entomologischen Institut. Fundort: Tonkin, Hoa Binh, leg. A. de Cooman und R. V. de Salvaza. Abbildungen: Taf. 14, fig. 11–14.

Aphanocephalus decoomani sp. n.

Kurz behaart. Die Oberfläche ist stark konvex und bei seitlicher Ansicht zeigt sich die stärkste Krümmung in der Mitte des Körpers, nach vorn und zur Elytrenspitze hin ist die Schwingung vermindert. Die Ränder am Pronotum und besonders an den Elytren sind kräftig abgesetzt, die Farbe ist tiefschwarz, am Kopfausschnitt und am Seitenrand des Pronotums rotbraun transparent und gelegentlich, besonders im Basalteil der Elytern, mit einem zarten metallischen Hauch, gelblich oder bläulich, übergossen. Die Punktierung der ganzen Oberfläche ist fein und gleichmässig, auf den Elytren sind die Pseudoporen grösser, sehr gleichmässig über die Fläche verteilt, finden sich aber in der Nähe des Scutellums oft zu einer Gruppe zusammen. Bei einer ganzen Anzahl der Tiere zeigt sich auf dem Pronotum eine Besonderheit. Sie besteht in vier zarten Furchen, welche strahlenförmig von der Mitte der Basis ausgehen und durch eine Anzahl grösserer Punkte ausgezeichnet sind. Die beiden mittleren Furchen fehlen häufig,manchmal ist überhaupt nur eine leichte Schwingung der Oberfläche nebst ein paar grösseren Punkten übriggeblieben. Im Gegensatz zu *hemisphaericus* Wollaston und *birmanus* Dodero ist die ganze Unterseite nebst Beinen so dunkel wie die Oberseite. Der Peniskörper ist dorsal an der

Spitze geschlitzt, beide Enden sind mehrfach gezipfelt. Die Zunge hat einen geschwungenen dicken Rand, der nach hinten (innen) in zwei freistehende scharfe Dorne ausläuft. Grösse: 2·25 × 1·7 bis 2·5 × 2 mm. Material: 12 Exemplare (Typus ♂♀ und Paratypen) im Pariser Museum, 4 Paratypen im Deutschen Entomologischen Institut, 1 Paratypus im Britischen Museum. Fundort: Tonkin, Hoa Binh, leg. A de Cooman, 1926, 1 Exemplar Laos, "betw. Vientiane and Luang Prabang" 1919, leg. R. V. de Salvaza. Abbildungen: Taf. 14, figs. 15–18.

Aphanocephalus prophysus sp. n.

Das einzelne Exemplar gehört zu den in Gestalt und Farbe einander ähnlichen Spezies mit je einem Fleck auf den Elytren. Diese mögen hier *prophysus* in Stichworten gegenüber gestellt werden:

bimaculatus Grouvelle (= ***austerus*** John), fast doppelt so gross und stärker sculptiert Australien
modiglianii Grouvelle, pronotum kürzer, der gelbliche Fleck auf den Elytren ist sehr gross Engano, Malaconni
vitreus Matthews, transparent, pronotum schmaler, Elytren mit grossem aufgelösten roten Fleck "China"
atomus Grouvelle, pronotum kürzer und schmaler, Randleiste der Elytren schmaler, Punktierung von gleicher Feinheit . . . . Mana Riang, Ranau, Palembang, Sumatra, Padang und Mentawai.
binotatus Grouvelle, ... nur auf den Seyshellen . . . .
pseudatomus n. sp., wie *atomus*, doch mit viel stärkerer Punktierung . . Tonkin, Hoa Binh.

Haare winzig. Gegenüber den genannten Spezies hat *prophysus* ein auffallend grosses und breites Pronotum, der Umriss ist daher verkehrt eiförmig. Die Oberfläche ist ebenso spiegelnd blank wie bei *atomus* Grouvelle, die etwas sparsamer gesetzte Punktierung ist ein wenig schärfer, trägt aber ebenso kurze Haare. Die Basis des Pronotums ist viel stärker geschwungen als bei *atomus*. Auf den Elytren sind die Pseudoporen weich eingesetzt und erscheinen dadurch etwas grösser. Der Schulterbuckel ist schwach, die Randpartie ist kräftig aufgekippt, verschwindet aber an der Spitze fast, die Randleiste ist abgeschrägt und zeigt die 6 Tuberkelporen deutlich. Die über der Randpartie befindliche Einschnürung der Elytren, welche bei den anderen Spezies eine fortlaufende Reihe grosser eingestochener Punkte trägt, ist hier nur mit wenigen schwachen Punkten besetzt. Der Fleck auf jeder Elytre ist klein, transparent braunrot und etwa um die Länge seines Durchmessers von der Sutura entfernt.

Grösse: 1·6 × 1·15 mm. Material: 1 Exemplar (Typus) im Britischen Museum. Fundort: Singapore, leg. Dr. M. Cameron. Abbildungen: Taf. 14, figs. 8–10.

Vom Britischen Museum erhielt ich 6 Exemplare von Käfern der Gattung *Aphanocephalus*, von denen Grouvelle je zwei mit den Namen "niger" und "sculpturatus" bezeichnet hatte, während das dritte Paar als potamophilus Lea, cotype bezettelt war. Beschreibungen sind nicht erschienen. Bei zwei Spezies konnte ich die Namen belassen, bei *sculpturatus* i. l. Grouvelle stelle ich fest, dass ich die Spezies nach einem einzelnen Exemplar desselben Fundortes und Sammlers bereits als *pellitus* n. sp. in einer Revision der Gattung *Aphanocephalus* beschrieben hatte. (Die Arbeit erscheint im 2. Heft der *Ent. Bl.* 1954).

Aphanocephalus potamophilus sp. n.

Drei australische Spezies sind bisher bekannt geworden: *bimaculatus* Grouvelle (= *austerus* J.), *hackeri* J. und *perlucidus* J., welche in Cairns, Brisbane und Rockhampton gefunden wurden. Zu ihnen kommt eine von Lea, 1921, gesammelte Spezies, die Lea selbst als "potamophilus" benannt, aber nicht beschrieben hat. Leider liegt als Fundort nur die allgemeine Angabe "Australia" vor, doch stammen die Tiere wahrscheinlich aus den Ausbeuten von den Lord Howe und Norfolk Inseln.

Lang behaart. Gelbbraun bis kastanienbraun, ungefleckt. Das Pronotum ist im ganzen etwas heller als die Elytren, es ist trapezförmig, am Kopfausschnitt fast gerade geschnitten und die schrägen Seitenlinien sind vom Basaltuberkel ab scharf nach innen umgebogen. Die Basis springt medial zum Scutellum vor.

Die Punktierung ist dicht und kräftig, die Länge der Haare beträgt etwa das 5–6-fache der Zwischenräume dieser Punkte.

Der Seitenrand der Elytren ist schmal, aber deutlich bis zur Elytrenspitze vom Discus abgesetzt durch eine mitlaufende Einschnürung, welche mit grossen Punkten perlschnurartig besetzt ist. Die Randleiste ist dick und trägt je 6 Tuberkelporen. An der Elytrenspitze lässt eine fast geradlinige Verbindung dieser Poren den Umriss kantig erscheinen.

Die Haarpunkte sind nur wenig kleiner als auf dem Pronotum, aber weitläufiger gesetzt, die Pseudoporen sind zahlreich, verschieden gross und tief eingelassen, die grösseren neigen zu ovaler Form.

Der Penis gleicht in seiner Anlage dem von *bimaculatus* Grouvelle (= *austerus* J., *Ent. Bl.* **37** (5/6), 1941, p. 193, fig. 10). Der distal spitz endende Peniskörper und die distal nicht gespaltene Zunge (Einlage) weichen im Bau so weit von dem Typ ab, der sich bei allen nicht australischen Spezies dieser Gattung bisher gefunden hat, dass man von einem gesonderten australischen Formkreis sprechen kann. Grösse 1·9 × 1·4 mm. Material: 2 Exemplare (Typus ♂♀) im Britischen Museum, Fundort: Australia, leg. Lea, 1921. Abbildungen: Taf. 15, figs. 1–4, Umriss, Penis, Pronotum, Sculptur.

Aphanocephalus niger sp. n.

Die bereits von Grouvelle mit dem Namen "niger" bezeichnete aber nicht beschriebene Spezies ist die zweite mir bekannt gewordene Spezies aus Indien.

Kurz behaart. Schwarz glänzend, am Rande des Pronotums und an der Basis der Elytren mit einem Stich ins rotbraune, breit oval, mit leichter Einschnürung der Umrisslinie an der Basis des Pronotums und deutlicher Abflachung am Kopfausschnitt. Die Basis ist gegenüber dem Scutellum stark konvex. Die Randleiste der Elytren ist schmal, aber bis zur Spitze hin deutlich, nach aussen leicht abgerundet. Sie trägt je 6 Tuberkelporen in schwachen Verbreiterungen der Leiste. Die Einschnürung des Discus oberhalb der Randleiste ist mässig und zeigt nur gelegentlich kleine punktförmige Vertiefungen. Die Punkte des Pronotums, aus denen die Haare entspringen, sind klein und weich eingesetzt, die Länge der Haare beträgt kaum die Hälfte der Zwischenräume dieser Punkte. Auf den Elytren sind die Haarpunkte fast doppelt so gross, untermischt mit etwas grösseren Pseudoporen, beide Formen sind weich in die Oberfläche eingesenkt, die Länge der Haare ist hier etwas geringer. Die Farbe der Unterseite ist braun, in der Mitte verdunkelt, Beine, Fühler und Mundteile sind gelbbraun. Die Behaarung ist fein, aber doppelt so lang wie auf der Oberseite. Beim ♀ ist die mediale Partie des Metasternums vor den Coxae 3 stark konvex, beim ♂ dagegen ziemlich flach. Grösse: 1·95 × 1·6 mm. Material: 2 Exemplare (Typus ♂♀) im Britischen Museum. Fundort: India, leg. Bowring, 63·47⁺ und Sarda, Bengal, F.W.C., 1927. Abbildungen: Taf. 15, figs. 5–8, Umriss, Penis, Pronotum, Sculptur.

Neue Spezies von *Cephalophanus* John

John: *Ent. Bl.* **36** (3), 1940, p. 81 und **38** (5/6), 1942, p. 171.

Die hier beschriebenen 4 neuen Spezies ergänzen in bemerkenswerter Weise die Kenntnis der Gattung, von welcher bisher nur 2 Spezies (l.c.) aus Chien-Hoa, Tonkin und Si-Rambé, Sumatra bekannt waren. Die Gattung ist durch zwei Eigentümlichkeiten ausgezeichnet, welche ihr innerhalb der Familie allein zukommen: die ♂♂ haben an den Tarsen des 1. Beinpaares gespaltene Klauen und im Innern ihres Körpers findet sich ein mehr oder weniger langer Chitinfaden, welcher medial an der Analseite des " 1." Sternits entspringt und zum Teil bis in das Metasternum hineinragt. Da das Ende dieses elastischen Fadens unter der Basis de Penis liegt, ist seine Funktion wohl zu vermuten, konnte bisher aber nicht eindeutig festgelegt werden. Die neuen Spezies stellen aber noch andere Probleme. Bisher konnte *Cephalophanus* zu den Gattungen gezählt werden, welche regelmässig 6 Tuberkel auf dem Seitenrand jeder Elytre besitzen. Aber die in 2 Exemplaren (♂♀) vorliegende Spezies *lewisi* besitzt jederseits 7 Tuberkel und es fragt sich nun, ob *Cephalophanus* sich hier wie *Notiophygus* Gory verhält, bei welcher Gattung nicht nur die Zahl der elytralen Tuberkel oft über 6 hinausgeht, sondern auch häufig eine Zahlvariation der linken und rechten Elytre gefunden wird, oder ob *Cephalophanus*, falls eine Vermehrung der Tuberkelzahl eintritt, diese auf beiden Seiten stets gleichmässig ausbildet. Weiterhin wurde bei der Spezies *dohertyi* (1♂, 2♀♀) bei einem ♀ ein abweichend geformtes " 1." Sternit gefunden, welches in der Art seiner Ausbildung einen völlig normalen Eindruck gemacht hätte, wenn nicht die gattungsgebundene Form bereits bekannt gewesen wäre (Abb. Taf. 13, fig. 1*d*). Es handelt sich hier nicht um eine Deformation, wie sie gelegentlich beobachtet wurde und durch Verletzungen der Puppe erklärt werden kann (*Suppl. ent.* l.c. **17**, 1929, Taf. 9 bei fig. 2) sondern anscheinend um eine Mutante, da die Abweichung beiderseits völlig regelmässig ausgebildet ist. Sie besteht in einem doppelten bogigen Ausschnitt des normalerweise zwischen die Coxae 3 zum Metasternum vorspringenden " 1." Sternits, wobei in diesem Fall in der Mitte der Intercoxalprocess als schmaler Vorsprung stehen bleibt, aber keine Verbindung mehr mit dem Metasternum besitzt. Es entwickelt sich ein tief in den Körper reichender Spalt, der nur durch eine zarte Haut ausgekleidet ist. Ich erwähne dies so ausführlich, weil ich eine ähnliche Erscheinung bei der Gattung *Solitarius* m. (*Ent. Bl.* **39** (1/2), 1943, p. 28) als normal angesehen, beschrieben und abgebildet habe. Dort handelt es sich ebenfalls um zwei tiefe Ausschnitte, die aber zu beiden Seiten der Mittelpartie am Vorderrand des Mesosternums liegen (*S. schaumi* m.). Damals stand mir nur 1♀ zur Verfügung. Eine Nachprüfung bei der zweiten zu *Solitarius* gehörenden Spezies des schon von Matthews beschriebenen *Aphanocephalus impunctatus* (*Ann.* lc. *Mag. nat. Hist.* (5), **19**, 1887) konnte leider nicht erfolgen, da das vorgelegte Exemplar bereits so stark geklebt war, dass ein völliges Zerfallen zu befürchten war. Es taucht also hier der Verdacht auf, dass das der Beschreibung zu Grunde liegende Exemplar von *Solitarius schaumi* ebenfalls eine Mutation war. Wenn es stets eine missliche Sache ist, eine Beschreibung nach einem Unikum auszuführen, so liegen die Verhältnisse bei den Notiophygidae leider so, dass die Tiere nur ausnahmsweise in grösserer Anzahl gefangen werden, meist werden am selben Ort nur 1 oder 2 Exemplare zufällig mitgesammelt und gleiche später nie mehr gefunden.

Cephalophanus bryanti sp. n.

Die Spezies hat eine fast halbkugelige Gestalt, die Farbe ist dunkelbraun, auf jeder Elytre befinden sich 2 grosse, goldbraune Flecke. Am Pronotum ist die Partie beiderseits des Kopfausschnittes ebenfalls fleckartig braun, doch kann diese Farbe sich auch seitlich bis zum 2. Tuberkel ausdehnen und vorn am Kopfausschnitt zusammenfliessen. Die vordere Ecke ist abgerundet, die dort beginnende Randleiste ist um die Tuberkelpore herum verbreitert und flach, wird im mittleren Teil schmal und hoch und hat vom 2. Tuberkel ab mehr als die doppelte Breite ihres mittleren Teiles. Die eingestochenen Punkte stehen im 3- bis 5-fachen Abstand ihrer Durchmesser und sind auf dem Discus kleiner als auf den Randpartien. Zwischen ihnen stehen sehr zahlreich die kleineren Haarpunkte. Auf den Elytren fehlen die Basal- und Randflecke der Tuberkel, das Basaltuberkel ist nicht, der Schulterbuckel ist nur schwach erhöht. Die Randpartie ist gegen den Discus bis kurz vor die Elytrenspitze abgesetzt, ihre Randleiste ist besonders im vorderen Teil stark erhöht und trägt jederseits 6 Tuberkelporen in kleinen Anschwellungen. Die Pseudoporen sind kleiner und stehen weiter voneinander entfernt, als die eingestochenen Punkte des Pronotums, sie sind auf dem Discus sehr zart, verstärken sich aber zu den Seiten hin und sitzen auch auf der Randpartie. Die Behaarung der Oberfläche ist dünn, aber ziemlich lang, auf den dunklen Teilen ist sie dunkel, auf den Flecken glänzt sie goldig. Bei den Fühlern ist das Basalglied braun, die Geissel samt Keule ist fast schwarz, die Behaarung ist im ganzen dunkel, nur an der Keule zum Teil auch farblos.

Grösse: 2·85 × 2·6 mm. Material: 1♂, 1♀ (Typen) im Britischen Museum, Fundort: Mt. Matang, W. Sarawak, leg. G. E. Bryant, Dezember, 1913. Abbildungen: Taf. 13, fig. 3*a*–3*c*, Taf. 14, fig. 1*a*–*c*.

Cephalophanus dohertyi sp. n.

Die Spezies ist ähnlich *clipeoexcisus* m. (*Ent. Bl.* **36**, (3), 1940, p. 82), doch besitzt sie 4 rundliche Flecke auf jeder Elytre. Die Farbe der Oberfläche ist dunkelbraun, die Flecke sind trüb rötlichgelb bis gelbbraun, gelegentlich verschwinden sie unter der langen grauen Behaarung, welche aus längeren und kürzeren einfachen Haaren besteht. Das Pronotum hat einen flach-konkaven Kopfausschnitt, der Übergang zum Seitenumriss ist völlig abgerundet, während zur Basis hin der Seitenrand mit der Basis scharf winklig zusammentrifft. Der Seitenrand besitzt eine breite, am Kopfausschnitt flachgedrückte Leiste. Kurz vor ihrem Anfang sitzt ganz aussen am Rande die apikale Tuberkelpore. Beim 2. Tuberkel verbreitert sich die Randleiste bogig um die Pore herum und läuft dann in doppelter Breite ihres vorderen Teiles bis zur basalen Ecke. Die Basis selbst ist beiderseits konkav, in der Mitte konvex und ist gegenüber dem Scutellum kurz quer abgestumpft. Im ganzen ist das Pronotum sehr schwach konvex, basal gegen das 2. Tuberkel hin sogar schwach konkav. Die Elytren sind breiter als die Basis des Pronotums. Sie haben eine kleine vorgezogene Schulterecke und besitzen einen schwachen Schulterbuckel und ein flaches Basaltuberkel. Vom Schulterbuckel her setzt sich eine flache Randpartie durch eine zum Aussenrand parallele Punktreihe ab. Sie bildet eine kräftige Randleiste aus, über welcher eine 2. Punktreihe dicht entlang läuft, während der Raum dazwischen im allgemeinen von Punkten frei bleibt. Hier sitzen — nicht erhöht — jederseits 6 gelbbraune Tuberkelflecke, während die zugehörigen Poren vor ihnen aussen auf der Leiste liegen. Vom Pronotum ist nur der mittlere Teil des Discus dunkel gefärbt, Kopfausschnitt und Seiten sind gelbbraun. Ebenso gefärbt sind auf den Elytren jederseits : das Basaltuberkel, dessen Pore sich in einigem Abstand von der Basis öffnet, 6 Tuberkelflecke auf der Randpartie und 4 rundliche Discoidalflecke, die mehr oder weniger deutlich sind. Die Behaarung ist auf dem Pronotum zarter und infolge aufrechter Stellung der Haare weniger sichtbar, als auf den Elytren, wo sie mehr anliegt und infolge häufiger Überdeckung einen zarten gelbbraunen Pelz bildet. Auf dem Pronotum finden sich stärkere und viel schwächere eingestochene Punkte, aus denen die Haare entspringen, die längeren Haare haben zudem kleine kuglige Körnchen als Basis, welche am Rande der grossen eingestochenen Punkte sitzen. Auf den Elytren sind die Pseudoporen so gross, wie die eingestochenen Punkte der Seitenteile des Pronotums. Ihr Abstand voneinander beträgt das 4- bis 6-fache ihres Durchmessers, das Innere liegt flach und zeigt keine Perforationspunkte. Die zwischen ihnen stehenden Haarpunkte sind kleiner als die kleinen Punkte des Pronotums.

Grösse : 3·95 × 3·25 mm. Material : 2 Exemplare (Typus ♂♀) im Britischen Museum, 1♀ (Paratypus) im Deutschen Entomologischen Institut. Fundort : Borneo, Peugaron, leg. Doherty. Abbildungen : Taf. 13, fig. 1*a*–1*g*.

Cephalophanus fasciatus sp. n.

Bei dieser Spezies ist der Gegensatz zwischen dem kleinen Pronotum und dem grossen Elytrenteil noch stärker als bei *dohertyi* sp. n. Die Farbe des Tieres ist dunkelbraun, die Ränder des Pronotums und Flecke der Elytren sind lebhaft gelbbraun. Die vorderen Discoidalflecke der Elytren fliessen zusammen, verbinden sich mit dem 1. und 2. Tuberkelfleck der Randpartie und berühren sich an der Sutura in einer erlöschenden Fortsetzung, so dass eine deutliche Binde quer über die Elytren entsteht. Ebenso fliesst der im Spitzenteil der Elytren befindliche Fleck mit dem 6. Tuberkelfleck zusammen. Die Behaarung ist etwas kürzer und weniger dicht als bei *dohertyi* sp. n., aber im Gegensatz zu dieser Spezies sind hier auf den dunklen Stellen der Oberfläche die Haare bräunlich, auf den Flecken aber gelbgrau. Beim Pronotum bildet sich am Übergang zum Seitenrand eine stumpfe Ecke, in der die apikale Tuberkelpore sitzt. Bereits etwas davor, vom Kopfausschnitt her, beginnt, breit und flach einsetzend, die dicke Randleiste, welche im mittleren Teil schmaler wird, aber um die basale Tuberkelpore und dann bis zur scharf geschnittenen Ecke sich wieder auf das doppelte verbreitert. Die Randpartie neben der basalen Pore ist etwas aufgetrieben. Die eingestochenen Punkte des Pronotums, welche die grösseren Haare tragen, sind auf den Seitenteilen etwas vermehrt und grösser als auf dem Discus. Die Haare stehen excentrisch, ihre Basis ist nicht so ausgeprägt wie bei *dohertyi*. Die übrigen kleineren Haarpunkte fallen wenig auf. Die Elytren haben einen rund erhöhten Schulterbuckel und ein flach aufgetriebenes Basaltuberkel. Die Randpartie ist nicht sehr deutlich abgesetzt, aber im vorderen Teil bis zum 3. Tuberkelfleck leicht aufgetrieben. Zwischen den mittleren und hinteren Discoidalflecken ist die Partie um die Sutura bis kurz vor die Elytrenspitze leicht eingesenkt, so dass hier jede Elytre schwach für sich kumuliert. Alle Flecke sind im Umriss verschwimmend eingesetzt. Die Pseudoporen sind so gross wie die grossen Punkte des Pronotums, ihre Innenfläche ist eben und die Perforation ist gelegentlich sichtbar. Sie sitzen im 3-bis 6-fachen Abstand ihres Durchmessers und sind sehr leicht in die Oberfläche eingebettet. Die Fühler, Mundteile und Beine sind braun, die Fühler sind im ganzen hell behaart. Grösse : 3·75 × 3·45 mm. Material : 1♀ (Typus) im Britischen Museum, Fundort : Perak, leg. Doherty. Abbildungen : Taf. 13, fig. *2a–2c*.

Cephalophanus lewisi sp. n.

Ähnlich *clipeoexcisus* m. (*Ent. Bl.* **36** (3), 1940, p. 82), doch mit breiterer Basis der Elytren, kürzerem Pronotum und 7 elytralen Tuberkeln. Auf den Elytren fehlen die Flecke am Basaltuberkel, und die Tuberkelflecke der Ränder sind nur um die Pore herum angedeutet. Die 3 Discoidalflecke heben sich schwach gelbbraun bis kräftig orangefarben von der dunkelbraunen Oberfläche ab. Ebenso gefärbt sind die Ränder des Pronotums und die äussere Randleiste der Elytren. Der Kopfausschnitt am Pronotum ist schwach konkav und läuft rund in die Seitenlinie über. Die breite, oben abgeflachte Randleiste trägt vorn die apikale Tuberkelpore, ist im mittleren Teil gegen die Innenfläche kräftig erhöht und verdoppelt ihre Breite von der Pore des Basaltuberkels bis zur scharfgeschnittenen Ecke. Der Discus ist sehr schwach gewölbt, wird zu den Randpartien flacher und ist gegen den Vorderabschnitt der Randleiste schwach konkav. Die Oberfläche ist dicht mit grossen und kleinen eingestochenen Punkten besetzt, von denen die grossen zu den Seiten hin ihren Durchmesser verdoppeln. Die Elytren besitzen einen gut gewölbten Schulterbuckel, aber nur ein mässig erhabenes Basaltuberkel. Die Randpartie ist deutlich abgesetzt und kurz vor der dicken Randleiste kräftig aufgekippt. Sie trägt jederseits 7 schwache Tuberkel, deren Poren aussen auf der Randleiste sitzen.

Die Pseudoporen der Oberfläche sind etwas kleiner als die grossen Punkte von den Randpartien des Pronotums, sie sind um das 2- bis 4-fache ihrer Durchmesser voneinander entfernt. Bei günstiger Beleuchtung sind in ihrer Mitte Perforationspunkte zu sehen. Die Behaarung besteht aus leicht gebogenen stärkeren und schwächeren Haaren von stumpf grauer oder auch dunkler Farbe, die aber auf den Flecken gelblich-rötlich aufglänzen. Die Unterseite mit Fühlern, Mundteilen und Beinen ist einheitlich braun, die Mitte des Metasternums und die Epipleuren sind dunkelbraun, die Sternite sind lang und anliegend behaart. Die Fühler sind in ganzer Länge hell behaart und die schlanke Keule ist auf ihrer Vorderseite eingeschnürt. Grösse : 3 × 2·8 mm. Material : 2 Exemplare (Typus ♂♀) im Britischen Museum, Fundort : Kuching, leg. I. E. A. Lewis, 1910. Abbildungen : Taf. 13, fig. 4*a*–4*d*.

Pondonatus gen. nov.

Die Gattung steht *Notiophygus* Gory nahe, hat aber 9-gliedrige Fühler, Flügel und andere Merkmale der körperlich kleinen Gattungen der Familie. Beim Pronotum fehlt die innere Randleiste, welche bei *Notiophygus* die Randpartie vom Discus trennt, an der Basis der Elytren fehlt das Basaltuberkel und auf der Oberfläche ist nur eine Haarform vorhanden. Die Seiten der Elytren sind von der Schulter bis zum letzten Drittel fast parallel und die Schenkel überragen den Körperumriss nicht. Die Oberfläche ist mit tiefen grubenförmigen Punkten besetzt, welche wie bei den anderen Gattungen auf dem Pronotum als " eingestochene Punkte " den Haaren als Basis dienen, auf den Elytren dagegen " Pseudoporen " sind, welche in ihrer Mitte eine feine Perforation besitzen, während die Haare in den Zwischenräumen entspringen. Das Pronotum hat eine gleichmässig schwach gewölbte Oberfläche und zeigt in einiger Entfernung vom Seitenrand eine mitlaufende leichte Schwellung (dort, wo bei *Notiophygus* die innere Randleiste sitzt) und die so gebildete Randpartie ist in ihrer Fläche konkav. Die beiden Tuberkelporen sitzen auf kleinen Verbreiterungen des Aussenrandes. Pronotum und Elytren sind eng aneinander geschmiegt, doch ist die Basis der Elytren etwas breiter als die des Pronotums und die Schulterecke ist ein wenig vorgezogen. Die Randpartie der Elytren ist konkav, bis zur Spitze deutlich und vom Discus durch eine fortlaufende Reihe unregelmässig gesetzter tiefer Punkte getrennt. Die 6 Tuberkel des Seitenrandes bilden schwache Schwellungen und ihre Poren sitzen aussen am Rande. Die Haare entspringen auf dem Pronotum innen am Rande der eingestochenen Punkte. Seitlich betrachtet, bilden sie kleine Häkchen, doch von oben gesehen spalten sie sich im letzten Drittel und ihre Enden sind weit gespreizt, sie stellen also eine Haarform dar, die bisher in der Familie noch nicht beobachtet wurde. Auf der Unterseite steckt der nach vorn gerichtete Kopf bis über die Augen im Ausschnitt des Prosternums. Die Fühler sind 9-gliedrig und besitzen eine dicke rundliche Keule. Die Mundteile sind denen von *Notiophygus* sehr ähnlich. Die Mandibeln sind 3-zähnig und besitzen eine Lacinia mobilis mit Kammzähnen, die Maxillen haben eine distal beborstete Lacinia und Galea sowie 4-gliedrige Palpi. Das Labium hat 3-gliedrige Palpi, welche nahe beieinander eingelenkt sind. Bei beiden Palpi ist das 2. Glied das grösste. Bei den Beinen erreichen nur die Schenkel des 3. Beinpaares den Aussenrand des Körpers und die Tibien haben die Länge der Schenkel. Die mittleren und vorderen Beinpaare haben kürzere Schenkel und ihre Tibien sind kürzer als die Schenkel. Die ersten beiden Tarsenglieder sind zusammen so lang wie das dritte. Vom Prosternum ab ist die Unterseite mit grossen eingestochenen Punkten besetzt, die in der Körpermitte die Neigung zum Schwinden zeigen. Von den Epimeren sind nur Reste schmaler Streifen in den Seitenwinkeln des Meso- und Metasternums sichtbar. Das " Ventralstück " des 7. Tergits ist schmal. Die Epipleuren sind mit einer fein punktierten Leiste gegen den Körper abgesetzt. Die Behaarung der Unterseite ist einfach und spärlich. Die häutigen Flügel haben im wesentlichen nur Costa und Media, ein Anallappen fehlt. Der Penis gleicht dem von *Notiophygus*, doch ist die Peniszunge (Einlage) stärker röhrenförmig gebildet. Die Gattung lebt in Pondoland, Süd-Afrika,. Typus: *Pondonatus turnrie.*

Pondonatus turneri sp. n.

Die Spezies ist schlank, stumpf braunschwarz und überall mit mehr oder weniger tiefen punktförmigen Gruben besetzt. Die Behaarung ist locker gestellt, bräunlich bis farblos, transparent. Das Pronotum ist medial am stärksten konvex, seine Randpartien sind durch einen schwachen Wulst vom Discus getrennt und zum Rande hin konkav ausgebildet. Der Kopfausschnitt ist von oben gut sichtbar und lässt den Kopf bis zum Fühleransatz hervortreten. Die Vorderecken am Seitenumriss, ebenso die Hinterecken sind abgerundet. Bei den beiden Tuberkelporen (s. Zeichnung →), welche aussen am Rande liegen, ist der Rand etwas verdickt und am basalen Tuberkel ist auch die daneben liegende Randpartie etwas aufgetrieben. Discus und Randpartien sind mit kleinen eingestochenen Punkten besetzt, die in Grösse und Tiefe etwas variieren. An den Rändern dieser Punkte entspringen die hakenförmig gebogenen, distal gespaltenen Haare. Das Scutellum ist klein, etwas eingesenkt. Die Elytren überragen seitlich das Pronotum und die Schulterecke ist dazu ein wenig vorgezogen, so dass der Eindruck entsteht, dass die Basalecke des Pronotums dort die Basis der Elytren überschneidet. Doch sind beide Teile nur sehr eng aneinander geschmiegt. Der Seitenumriss der Elytren ist nur schwach konvex, fast gerade, im Spitzenteil läuft die Randlinie halbkreisförmig zusammen. Der Schulterbuckel ist gut entwickelt, ein Basaltuberkel fehlt aber (s. *Notiophygus*). Die Pseudoporen der Oberfläche sind bedeutend grösser als die eingestochenen Punkte des Pronotums und die Haare entspringen zwischen ihnen. Die Randpartie ist schmal, am Rande konkav und bis zur Spitze deutlich abgesetzt, sie trägt 6 schwach erhabene Tuberkel beiderseits, deren Poren an der Aussenseite des Randes liegen. Die Unterseite ist im ganzen schwarz bis schwarzbraun glänzend, Pro-, Meso-, Metasternum und Sternite sind mit grossen eingestochenen Punkten besetzt, aus denen sehr zarte einfache Haare entspringen. Das " 1." Sternit ist sehr breit, die übrigen schmal, ohne besondere Merkmale.

Grösse: 2·05 × 1·4 bis 2·2 × 1·6 mm. Material: 41 Exemplare (Typus ♂♀, Paratypen) im Britischen Museum, 8 Exemplare (Paratypen) im Deutschen Entomologischen Institut. Fundort: 24 Exemplare Port St. John, Pondoland; 18 Exemplare E. Cape Prov., Katberg ; 5 Exemplare Eshowe, Zululand ; 2 Exemplare Natal : Kloof, leg. R. E. Turner. Abbildungen : Taf. 16, figs. 1–8.

Im Gegensatz zu den Verhältnissen bei *Notiophygus*, wo jeder Fundort eine neue Spezies ergibt, liegt hier ein auffallend weiträumiges Siedlungsgebiet einer Spezies vor. Es dürfte wohl naheliegen, diese Ausbreitung mit dem Besitz von Flügeln in Verbindung zu bringen. Gestützt wird diese Ansicht durch die ebenfalls weiträumige Verbreitung der zur geflügelten Gattung *Praviclava* John (*Mitt. dtsch. ent. Ges.* **10**, (9/10), 1941, p. 103) gehörenden Spezies *corrosa* m., welche aus der Gegend des Victoria Sees, Insel Ukerewe und aus Kamerun, Makak, bekannt geworden ist.

Profallia gen. nov.

Als Sharp die amerikanische Gattung *Fallia* aufstellte (*Biol. cent.-amer. Col.* **2** (1), 1902, p. 629), betonte er die Verwandtschaft mit *Aphanocephalus* Woll. und setzte sich mit den Versuchen auseinander, diese Gattung zu placieren. Er lehnt Matthews Vorschlag ab, eine Familie der Pseudocorylophidae zu bilden, bezweifelt aber auch Horns Familie der Discolomidae. Er hält alle diese Formen für abweichende Colydiidae.

Inzwischen ist die Familie der Notiophygidae (= Discolomidae) nicht nur anerkannt worden, sondern ist auf bisher 13 Gattungen angewachsen und ihre Trennung von den Colydiidae ist auf Grund eindeutiger Merkmale zweifelsfrei durchgeführt. Es zeigte sich, dass die Notiophygidae in Beziehung auf ihren inneren Körperbau, einschliesslich der Sexualorgane, eine weit grössere Analogie besitzen, als die Colydiidae. Sie können zudem auf Grund von 2 äusseren Merkmalen auch von denjenigen Colydiidae getrennt werden welche innerhalb allgemein tetramerer Gattungen trimer sind.

Diese Merkmale sind :

(1) Der Besitz von 3 Paar gleichgebildeten kugeligen Hüften.

(2) Der Besitz offener Poren am Körperrand und zwar wenigstens 2 am Seitenrand des Pronotums und wenigstens 6 am Seitenrand der Elytren (oberseits oder unterseits).

Die neue asiatische Gattung steht *Fallia* Sharp näher als *Parafallia* Arrow zu *Fallia*. Leider sind nur 2 Exemplare einer Spezies vorhanden, doch zweifle ich nicht, dass diese Gattung sich ebenso verhalten wird, wie ihre nächsten Verwandten, d. h. die verschiedenen Spezies werden so geringe Unterschiede aufweisen, dass unbedenklich auch nach einer Spezies die Gattungscharaktere festgelegt werden können.

GATTUNGSDIAGNOSE.

Die Grösse der Käfer ist ungefähr die gleiche wie bei der Gattung *Fallia*. Der eliptische Umriss des Körpers ist bei *Fallia* leicht eiförmig, wobei das stumpfe Ende vorn am Pronotum liegt. Zugleich ist der Kopfausschnitt mehr oder weniger breit quer abgeschnitten und gibt dadurch dem Umriss ein rundlich-kantiges Aussehen. Die Gestalt von *Profallia* ist dagegen schmal-eliptisch, vorn und hinten völlig abgerundet, vorn ein wenig schmaler als hinten, aber in keiner Weise eiförmig. Von der Seite betrachtet, fällt die Abweichung der Rückenlinie gegenüber *Fallia* besonders auf: *Profallia* ist fast ¼ niedriger bei gleicher Länge. Bei Seitenansicht bildet die Randlinie der Elytren mit der Randlinie des Pronotums an der Schulterecke bei *Fallia* einen Winkel von *ca.* 135°oder 1½ rechte Winkel, bei *Profallia* ist dieser Winkel bedeutend stumpfer und liegt etwa bei 160°. Das Pronotum bildet fast einen vollen Halbkreis, wenn man die Basis als Durchmesser betrachtet. Der Kopfausschnitt ist von oben her nicht sichtbar, bei genauerer Prüfung findet sich aber ein leichter, sehr flachwinkliger Kerb und von vorn gesehen bildet der Kopfausschnitt einen sehr flachen Bogen, der ohne Ecke rund in die Seitenlinie übergeht. Dort setzt eine schmale Randleiste an, welche bis zur Basis reicht. Am Ansatz dieser Leiste liegt die nach vorn geöffnete 1. Pore, während die 2. etwas vor der Basalecke in einer schwachen Verbreiterung der Randleiste liegt. Die Oberfläche des Pronotums ist glatt und gleichmässig gekrümmt, an den Seiten, besonders aber vor dem Kopfausschnitt ist die Krümmung etwas stärker. Die Basis ist medial schwach konvex, aber vor den Basalecken konkav. Das Scutellum ist etwas breiter als lang. Die Elytren sind im ganzen stärker konvex als das Pronotum und ihre Schulterecke ist abgerundet. Die dort plötzlich breit einsetzende Randleiste ist mehrfach breiter als die des Pronotums und zeigt an ihrem Ansatz einen Kerb, in welchem die Basalecke des Pronotums ruht (wie bei *Fallia* und *Aphanocephalus*). Die Fläche dieser gegen den Discus scharf abgesetzten Leiste ist etwas schräg nach aussen geneigt und zeigt sehr deutlich 6 Poren, welche auf Verbreiterungen der Leiste liegen. Seitlich betrachtet krümmt sich die Rückenlinie vor der Spitze soweit rückläufig, dass die Randleiste dort von oben her nicht mehr zu sehen ist. Das Pronotum ist mit spärlich stehenden eingestochenen Punkten besetzt, welche sehr feine kurze Haare tragen (bei 60-facher Vergr. zu sehen). Die Oberfläche der Elytren zeigt deutlich 2 Formen von Gruben, die kleineren Haargruben und die grösseren Pseudoporen. Der Kopf ragt bis zum Fühleransatz aus dem Pronotum heraus, er ist spärlich aber viel länger behaart als die Oberfläche. Der Clipeus ist durch eine scharfe Naht von der Stirn getrennt. Die Fühler sind 8-gliedrig, das Basalglied ist seitlich etwas kantig, die Keule ist so breit wie lang, rundlich-dreieckig und flachgedrückt. Das 4. Glied zeigt eine Abschnürung, die darauf hinweist, dass auch, wie bei *Fallia,* Spezies mit 9 Gliedern gefunden werden könnten. Die Mundteile zeigen eine weitgehende Übereinstimmung mit denen der nächststehenden Gattungen. Die Mandibeln sind 3-zähnig und besitzen eine Lacinia mobilis, die Maxillen haben eine distal beborstete Galea und Lacinia und 4-gliedrige Palpi. Die Unterlippe hat 3-gliedrige Palpi. Die Unterseite zeigt im Bau den Familientyp, das " 1." Sternit bildet eine glatte Fläche. Die Behaarung ist spärlich aber länger als auf der Oberseite. Die Schenkel erreichen den Umriss des Körpers nicht, die Tibien des 1. und 2. Beinpaares sind kürzer als die Schenkel, die Tibien des 3. Beinpaares sind so lang wie die Schenkel. Bei den Tarsen ist die dritte so lang wie die beiden ersten zusammen. In Übereinstimmung mit den übrigen Gattungen ist auch die Verlängerung der Hüften im Innern des Körpers. Auch hier sind alle drei Paare von gleicher Bauart. Bei den Sterniten ist die ursprüngliche Zahl von 7 Sterniten durch Verschmelzen der ersten drei auf fünf reduziert und dieses " 1." Sternit zeigt im Innern bei vielen Gattungen durch stehengebliebene Leisten seine Herkunft aus 3 Sterniten deutlich an. Bei der vorliegenden

Gattung ist aber diese Verschmelzung so weitgehend, dass eine Dreiteilung nicht mehr sichtbar ist. Die Gattung ist geflügelt. Die Alae besitzen nur Costa und Media, ein Basallappen fehlt. Der Penis gleicht im Grundschema dem von *Parafallia* (der Penis von *Fallia* ist noch nicht bekannt), doch ist die Basis der Peniszunge (Einlage) hier so stark ausgebildet, dass sie vom Gelenk ab im Bogen aus der dorsal geschlitzten Basis des Peniskörpers heraustritt, ehe sie als Röhre ventral hervorkommt. Dazu teilt sich von ihrem Grunde her ventral ein schmaler Streifen ab, welcher stark chitinisiert ist und vielleicht als Führung dient. Habitat : Malakka, Typus : *Profallia cameroni.*

Profallia cameroni sp. n.

Die Beschreibung ist im wesentlichen in der Gattungsdiagnose enthalten. Hier folgen noch einige Angaben, welche für die Trennung von Spezies entscheidend sein können.

Die Gesamtfarbe ist dunkelbraun. Die Elytren tragen in ihrer Mitte je einen roten verschwommenen Fleck, der die Seite und die Sutura nicht erreicht und welcher so dunkel ist, dass er nur schwer sichtbar wird. Bei den Elytren sind die Haarpunkte kräftiger als auf dem Pronotum und sind nebst den Pseudoporen weich in die Oberfläche eingebettet, erscheinen daher oft zu Zweien oder Dreien zusammenfliessend. Seitlich gesehen, liegt die höchste Erhebung der Körperkrümmung hinter der Mitte, und das Pronotum ist etwas schwächer konvex als der Spitzenteil der Elytren. Die Randpartie der Elytren zeigt eine deutliche scharfe Kante als Aussenlinie und auf ihr sitzen die 6 Poren. Im letzten Drittel der Elytren wölbt sich der Discus ein wenig über die Randlinie hinaus, das heist diese Linie unterläuft den Discus. Die Fühler sind 8-gliedrig. Beim 4. Fühlerglied ist eine Teilung angedeutet, doch ist keine echte Articulation vorhanden. Die breite Keule zeigt eine leichte Abschnürung.

Grösse : 1·42 × 0·9 mm. Material : 2 Exemplare (Typus ♂, Paratypus) im Britischen Museum, Fundort : Singapore, Dezember, 1915, leg. Dr. Cameron. Abbildungen : Taf. 17, figs. 3*a*–3*c* und 4–7.

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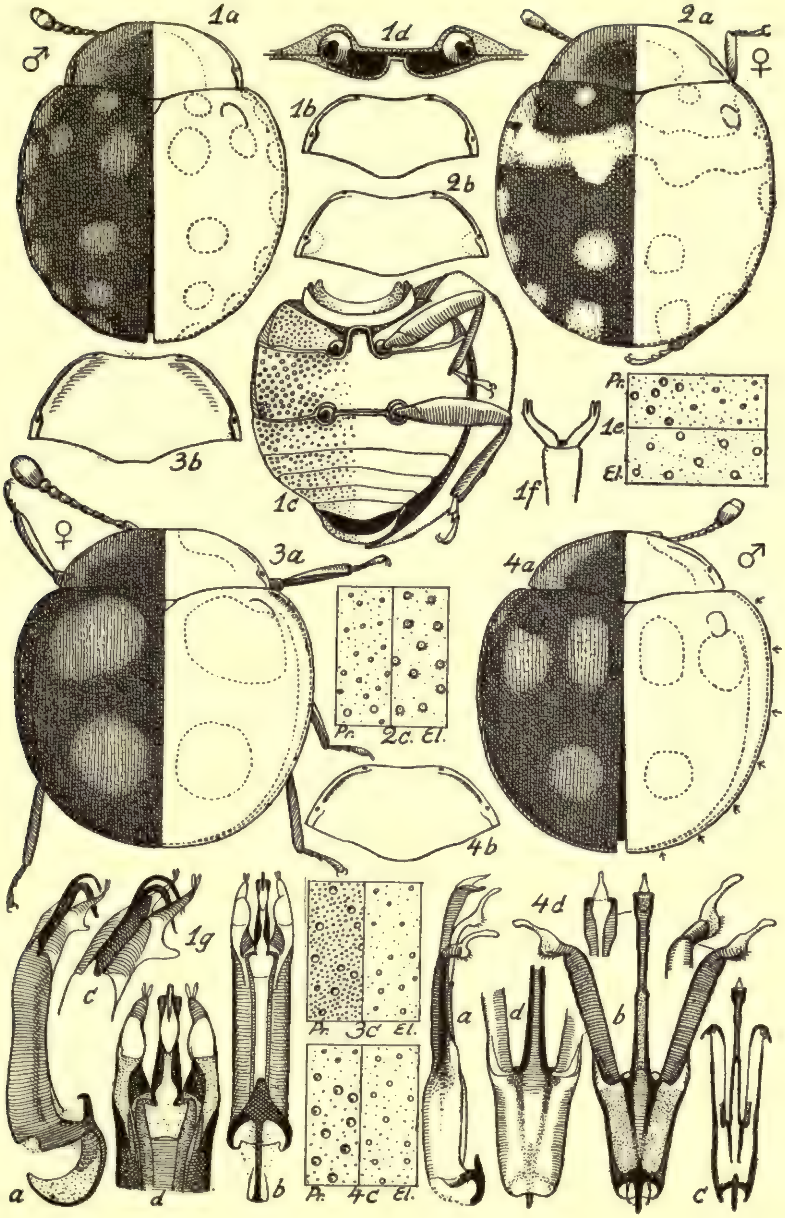
TAF. 13.

FIG. 1*a*–1*g*. *Cephalophanus dohertyi* sp. n.; 1*a*, Umriss mit Fleck- und Farbverteilung; 1*b*, Pronotum von oben; 1*c*, Unterseite; 1*d*, abweichende Bildung des "1." Sternits bei einem ♀; 1*e*, Sculptur von Pronotum (*Pr*) und Elytren (*El*); 1*f*, gespaltene Klauen eines ♂, nur am ersten Beinpaar vorhanden; 1*g*, Penis, *a*, lateral; *b*, ventral; *c*, halb von hinten; *d*, Penisspitze ventral.

FIG. 2*a*–2*c*. *C. faciatus* sp. n. 2*a*, Umriss mit Fleck- und Farbverteilung; 2*b*, Pronotum von oben; 2*c*, Sculptur von Pronotum (*Pr*) und Elytren (*El*).

FIG. 3*a*–3*c*. *C. bryanti* sp. n. 3*a*, Umriss mit Fleck- und Farbverteilung; 3*b*, Pronotum von oben; 3*c*, Sculptur von Pronotum (*Pr*) und Elytren (*El*).

FIG. 4*a*–4*d*. *C. lewisi* sp. n. 4*a*, Umriss mit Fleck- und Farbverteilung; 4*b*, Pronotum von oben; 4*c*, Sculptur von Pronotum (*Pr*) und Elytren (*El*); 4*d*, Penis: *a*, lateral, *b*, ventral, (Stellung der Seitenteile im Wassertropfen); *c*, ventral (Lage *in situ*); *d*, Basis dorsal.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♂
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2c. El.
4b
1g
c
4d
a
d
b
Pr. 3c El.
Pr. 4c El.
a
d
b
c

TAF. 14.

FIG. 1. *Cephalophanus bryanti* sp. n. Penis, *a*, lateral; *b*, ventral; *c*, mittlere Spitze halb dorsal.

FIGS. 2–6. *Aphanocephalus pseudatomus* sp. n. 2, Umriss mit Farbverteilung und Sculptur; 3, Antennenkeule; 4, Penis, *a*, lateral, *b*, ventral; 5, Sculptur, *Pr*, Pronotum, *El*, Elytren; 6, Pronotum unverkürzt.

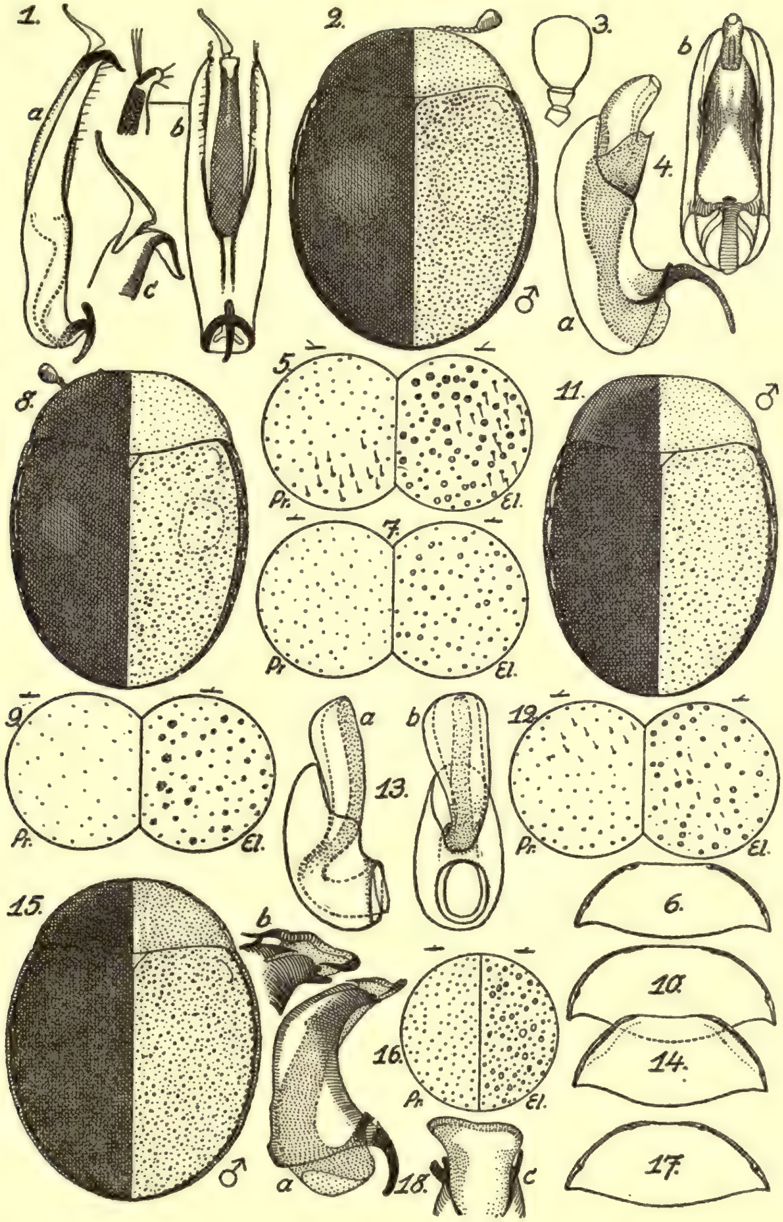
FIG. 7. *A. atomus* Grouv.: Sculptur zum Vergleich mit *pseudatomus*, *Pr*, Pronotum; *El*, Elytren.

FIGS. 8–10. *A. prophysus* sp. n. 8, Umriss mit Farbverteilung und Sculptur; 9, Sculptur, *Pr*, Pronotum, *El*, Elytren; 10, Pronotum unverkürzt.

FIGS. 11–14. *A. tonkinensis* sp. n. 11, Umriss mit Farbverteilung und Sculptur; 12, Sculptur, *Pr*, Pronotum, *El*, Elytren; 13, Penis, *a*, lateral, *b*, ventral; 14, Pronotum unverkürzt.

FIGS. 15–18. *A. decoomani* sp. n. 15, Umriss mit Farbverteilung und Sculptur; 16, Sculptur, *Pr*, Pronotum, *El*, Elytren; 17 Pronotum unverkürzt; 18, Penis, *a*, lateral, *b*, Spitze halb dorsal, *c*, Spitze ventral.

Oberhalb der kreisförmigen Sculpturzeichnungen sind die zugehörigen Haarlängen auf kurzen wagrechten Strichen angegeben.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15.
♂
16.
Pr.
El.
17.
18.
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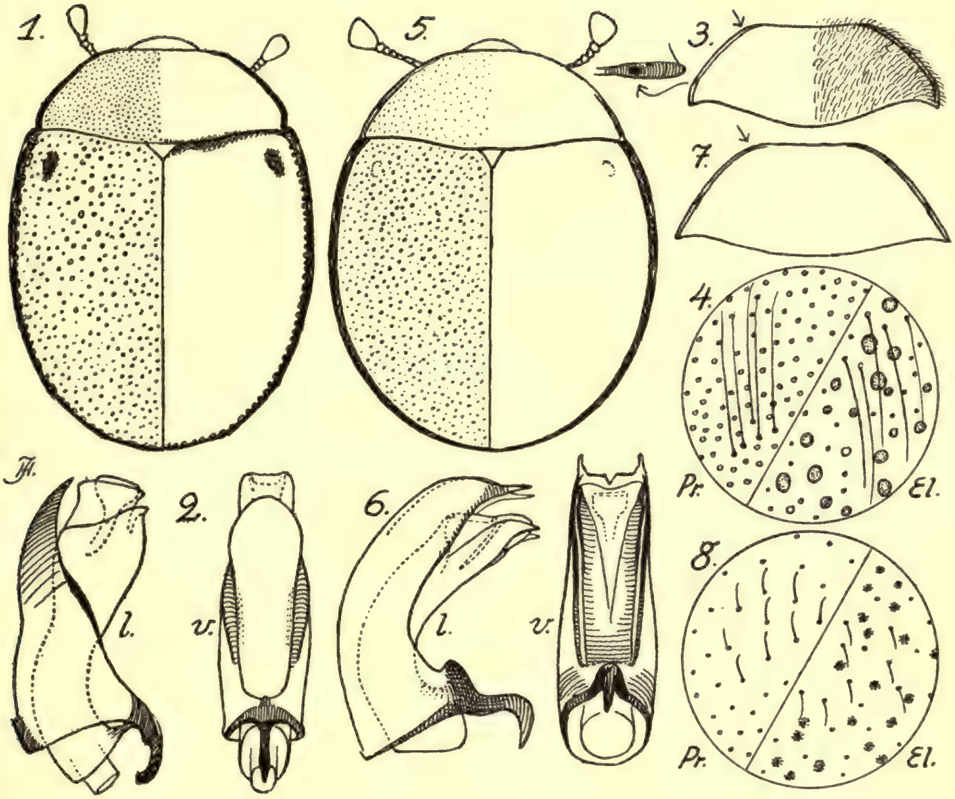
TAF. 15.

FIGS. 1–4. *Aphanocephalus potamophilus* sp. n.
FIGS. 5–8. *A. niger* sp. n.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TAF. 16.

Alle Figuren beziehen sich auf *Pondonatus turneri* gen. n., sp. n.

FIG. 1. Mundteile, *a*, Labrum; *b*, Mandibeln mit den Chitinverstärkungen der Muskeln des Abductors und Adductors und der Lacinia mobilis (↙); *c*, Maxille mit 4-gliedrigem Palpus; *d*, Labium mit 3-gliedrigen Palpi.

FIG. 2. Penis, *a*, lateral; *b*, ventral.

FIG. 3. Rückenpartie (Mesonotum, Metanotum, 7 Tergite) nebst Alae und Elytren.

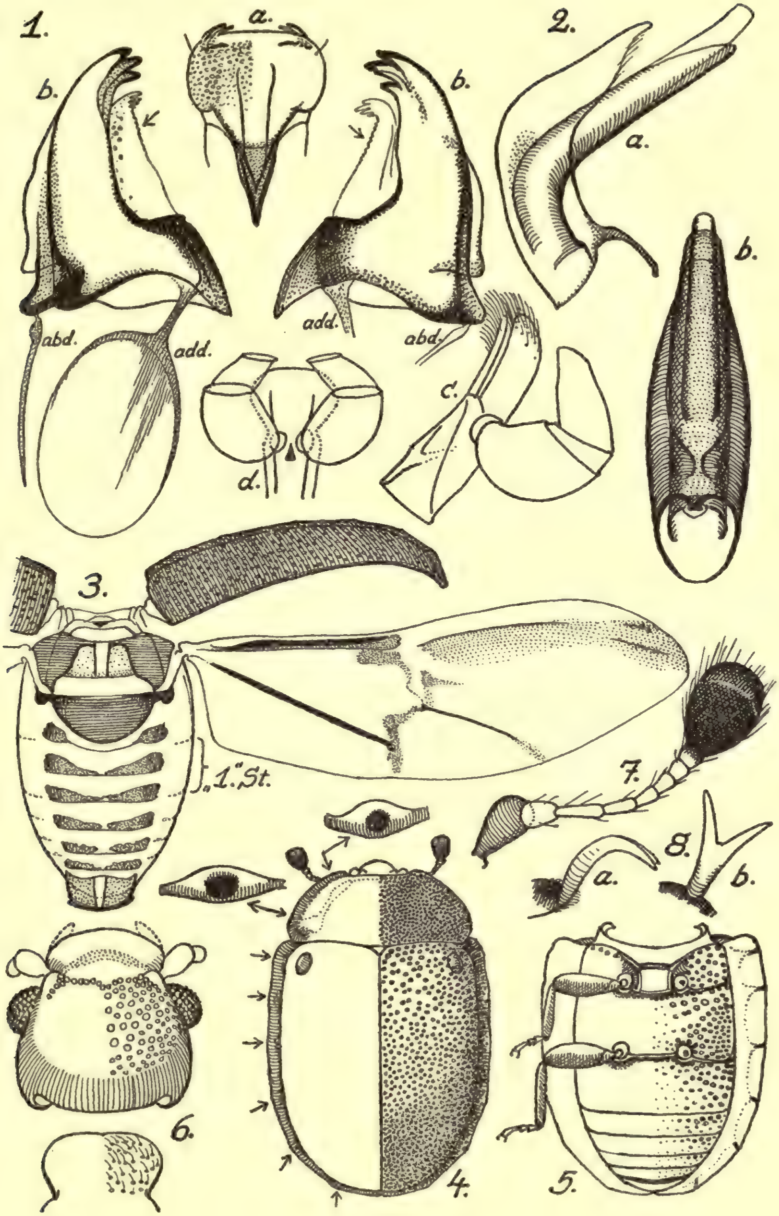
FIG. 4. Aufsicht, rechts ist die Sculptur der Oberfläche eingezeichnet, links geben die Pfeile die Stellen an, an welchen sich aussen am Rande die Tuberkelporen öffnen, Nebenzeichnungen: Die beiden Poren am Rande des Pronotums.

FIG. 5. Unterseite, 5 Sternite, das " 1." Sternit entspricht den ersten 3 Tergiten. Zwischen Analspalte und Elytrenspitze ist das " Ventralstück" des 7. Tergits sichtbar.

FIG. 6. Kopf, darunter der Clipeus.

FIG. 7. 9-gliedriger Fühler.

FIG. 8. Haare. *a*, lateral; *b*, dorsal.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TAF. 17.

FIG. 1*a*. ***Parafallia simoni*** John. 1*b*, links die normale Umrandung der basalen Tuberkelpore, rechts eine seltene Abweichung der Umrandung. 1*c*, Penis, *l*, lateral, *v*, ventral, dazwischen : Penisspitze halb dorsal.

FIG. 2*a*. ***Fallia schmidti*** John. 2*b*, Pronotum (*Ent. Bl.* **40**, (3/4), 1944, p. 88), beide Figuren zum Vergleich mit Figs. 3*a* und 3*b*.

FIG. 3*a*. ***Profallia cameroni*** gen. n., sp. n. Umriss, 3*b*, Pronotum ; 3*c*, Kopf von oben und 8-gliedriger Fühler.

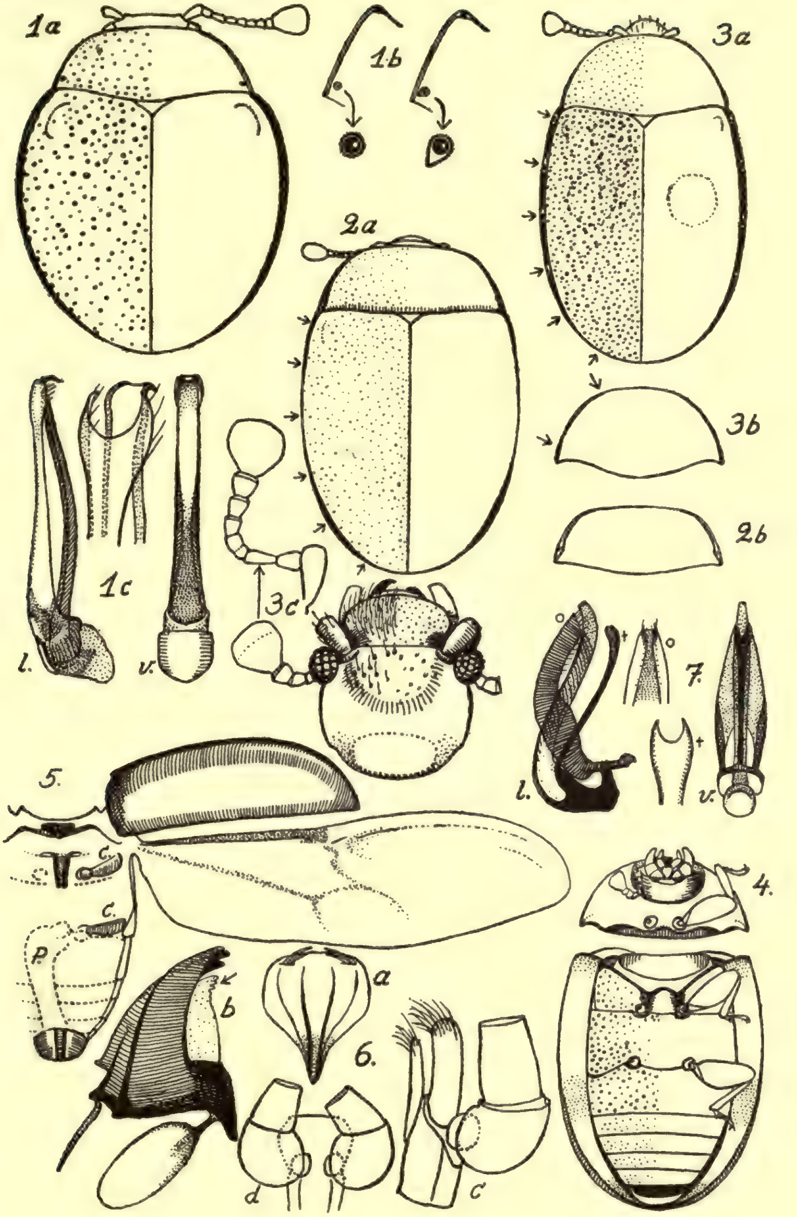
FIG. 4. ***P. cameroni***, Unterseite.

FIG. 5. ***P. cameroni***, Rückenpartie mit innerer Verlängerung der Hüften (*c*), Penis (*P*) und Flügel.

FIG. 6. ***P. cameroni***, Mundteile. *a*, Oberlippe ; *b*, Mandibel mit Lacinia mobilis (↙) ; *c*, Maxille mit 4-gliedrigem Palpus, *d*, Unterlippe mit 3-gliedrigen Palpi.

FIG. 7. ***P. cameroni***, Penis, *l*, lateral, *v*, ventral, dazwischen die durch Kreis und Kreuz bezeichneten Teile vergrössert, ventral gesehen.

Anschrift des Verfassers : Bad Nauheim, Frankfurterstrasse 54, Germany.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(TRICHOPTERA: RHYACOPHILIDAE)

MARTIN E. MOSELY

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Pp. 315–346 ; 86 *Text-figures*

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THE *PROTOPTILA* GROUP OF THE GLOSSOSOMATINAE

(TRICHOPTERA : RHYACOPHILIDAE)

By MARTIN E. MOSELY*

IN 1937, when describing some Mexican Hydroptilidae (*Trans. R. ent. Soc. Lond.* **86** : 151–190), I remarked of *Protoptila* : "It is perhaps open to question whether *Protoptila* should not be placed in the Rhyacophilidae rather than the Hydroptilidae." Following this suggestion Dr. H. H. Ross, writing in 1938 (*Ill. Nat. Hist. Surv. Bull.* **21** : 112), placed the genus in the Rhyacophilidae, subfamily Glossosomatinae. For my part I retained the genus in the Hydroptilidae for the time being, as I had a large amount of Mexican material still unsorted and considered that there was a possibility that more new genera belonging to the group might be found when I should be able to spare the time for a further examination. When describing Brazilian Hydroptilidae (1939, *Novit. Zool.* **41** : 218–224), I erected two new genera akin to *Protoptila*, still retaining the group in the Hydroptilidae. Subsequently I received a letter from Dr. G. Ulmer in which he wrote "I am now sure that *Mortoniella* and *Protoptila* do not belong to the Hydroptilidae but to the Glossosomatinae of Rhyacophilidae. . . . If *Mortoniella* and *Protoptila* are Glossosomatinae, then the genera *Mexitrichia, Canoptila* and *Antoptila* will belong also to this subfamily, perhaps *Padunia* Mart. (?)". On receipt of this letter I determined to complete my examination of the Mexican material and to deal with all the genera concerned. It was my own inclination to make a new subfamily of the Rhyacophilidae to take these kindred genera, but as both Ulmer and Ross consider that there is close relationship in the earlier stages to genera in the Glossosomatinae, I accepted their view and make the transfer accordingly.

The genus *Protoptila*, the first to be described in the group, probably contains a great number of species, but in this paper I propose to confine myself to those Mexican and Brazilian genera and species with which I am personally acquainted. Dr. Ross has described many more from North America in his papers on Illinois Trichoptera. Other genera in the group are *Mexitrichia* (Mexico and Brazil), *Mortoniella* (Brazil), *Antoptila* (Brazil), *Canoptila* (Brazil) and a new genus from Mexico, described in this paper under the name *Culoptila*, found in the material which I had set aside for further examination. With regard to *Padunia* Martynov, if this genus should really prove to be associated with *Protoptila* and its allies (of which Ulmer does not seem to be entirely convinced), attention should be drawn to the far more complete neuration of the posterior wing, as figured by Martynov, than is to be found in any of the other genera in the group, although that of the anterior wing agrees tolerably well with at least *Antoptila*.

---

* Mr. Martin E. Mosely died in 1948.

All the genera in the group are characterized by a pale streak at the anastomosis, covering the cross-veins from the radius to the media, which are always aligned, the remaining cross-veins of the anastomosis generally continuing the line down to the post-costa. The new genus *Culoptila* is remarkable for the extraordinary development of the tegulae which, in the male sex, are enlarged to form hollow caps, at the base of which is situated a structure that no doubt functions as a scent-organ. More will be found about this structure in the generic account.

All the species in these genera have a ground-colour of chestnut brown ; in some of the Brazilian species the anterior wings are decorated with silver bars, particularly along the anastomosis. When denuded, it is seen that the membrane at the anastomosis is coloured yellow. It may be added that in the anterior wing of *Protoptila* there is a short arc of stiff bristles situated on the membrane between Cu_2 and the anal veins. In the other genera of the group this arc is represented by a short straight row of similar bristles arising from the posterior margin of Cu_2. All species have a ventral process to the sixth sternite, that of *Culoptila* being somewhat peculiar in form.

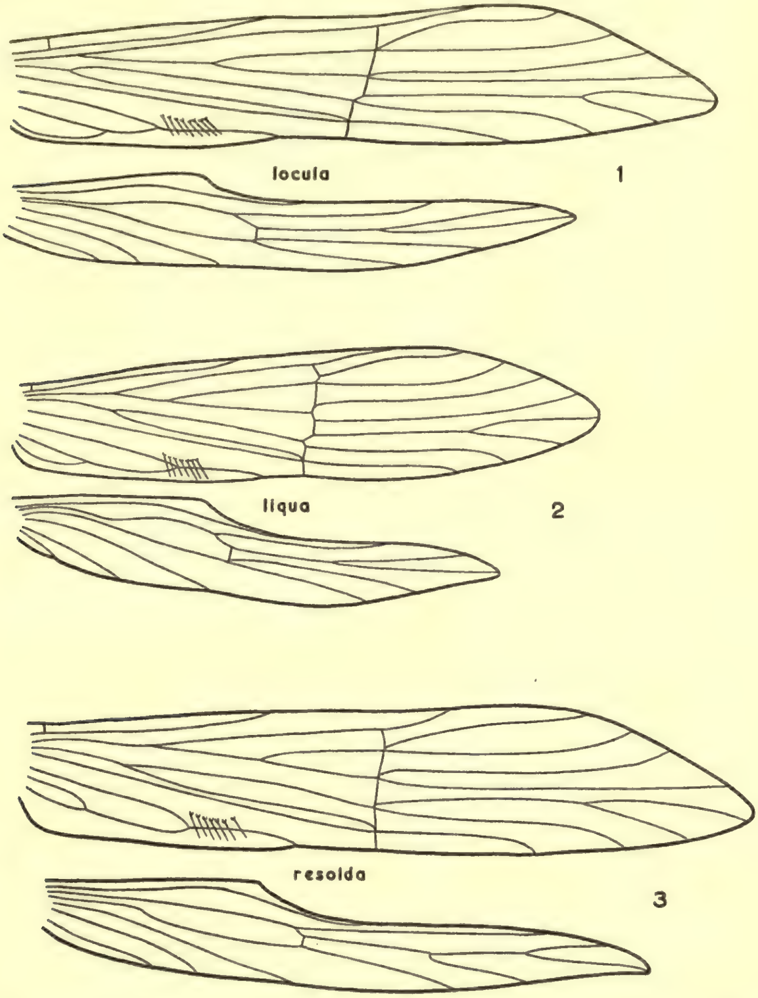
The Mexican species described in this paper were collected by Dr. Adolph Dampf, and all the types are deposited in the British Museum (Nat. Hist.).

Finally, I must acknowledge the help given me by Mr. D. E. Kimmins, of the Dept. of Entomology, who has not only drawn all the figures illustrating this paper, but has also put his younger eyes at my disposal in making out the very intricate and obscure structures of the genitalia of this difficult group.

Protoptila Banks

Banks, 1904, *Proc. ent. Soc. Wash.* **6** : 215. Ulmer, 1906, *Notes Leyden Mus.* **28** : 99 ; *id.*, 1907, *Gen. Insect.* **60a** : 220. Betten, 1934, *N.Y. Mus. Bull.*, **292** : 149. Mosely, 1937, *Trans. R. ent. Soc. Lond.* **86** : 152. Ross, 1938, *Ill. Nat. Hist. Surv. Bull.* **21** : 112 ; *id.*, 1944, *op. cit.*, **23** : 41.

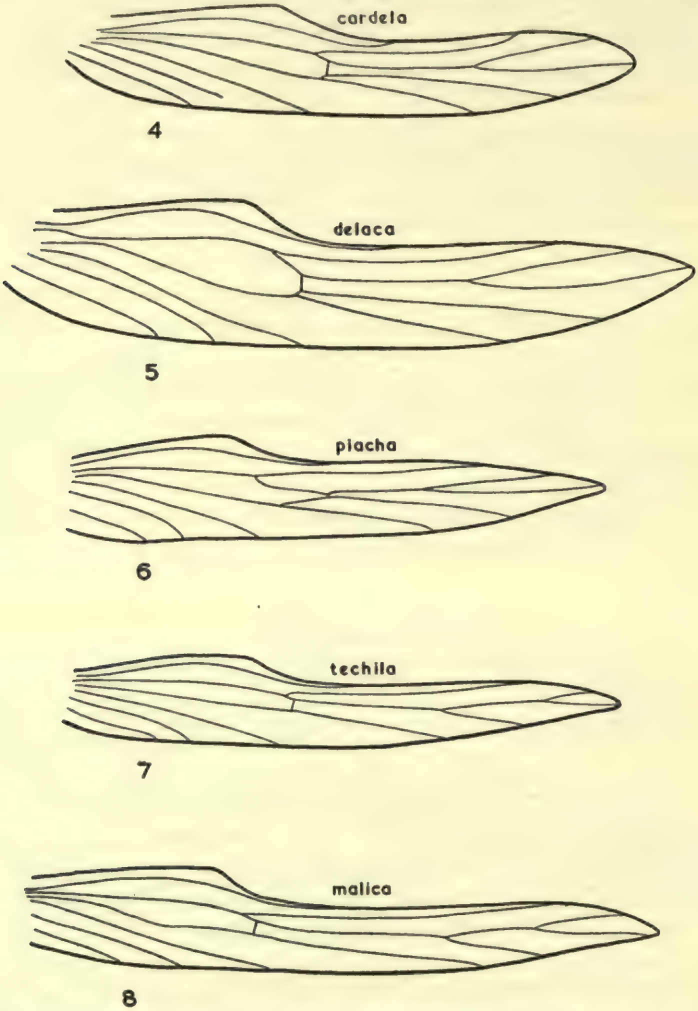
In the ♂, the genital characters are very obscure and it is scarcely possible to homologize them with corresponding parts in other Trichoptera species. In the descriptions I have already made, I have attempted to follow McLachlan's nomenclature of the genital parts, but my naming of such organs as " intermediate appendages," "penis-sheaths " is necessarily arbitrary. I have failed to recognize any process that could be termed an inferior appendage, though Ross describes these processes in some of his species. In many of the species, the ventral margin of the eighth segment is modified to such an extent that it is difficult to avoid the conclusion that this segment functions as a structure of the genitalia. The description "penis-sheaths " for the telescoped structures terminating in a strong and often sinuous spine is perhaps open to criticism, since penis-sheaths of this form are, so far as I know, unknown in the Trichoptera. I have hesitated as to whether they may not function as inferior appendages, but their origin seems too near the dorsal half of the ninth segment for them to be so regarded. What I have termed " intermediate appendages" might equally be superior appendages or even processes of the dorsal plate. In a paper of this nature, it is immaterial what the parts are termed, provided that the connection between the descriptions and the figures is clearly indicated.



FIGS. 1–3. Neuration of wings of 1, *Protoptila locula*, ♂; 2, *P. liqua*, ♂; 3, *P. resolda*, ♂.

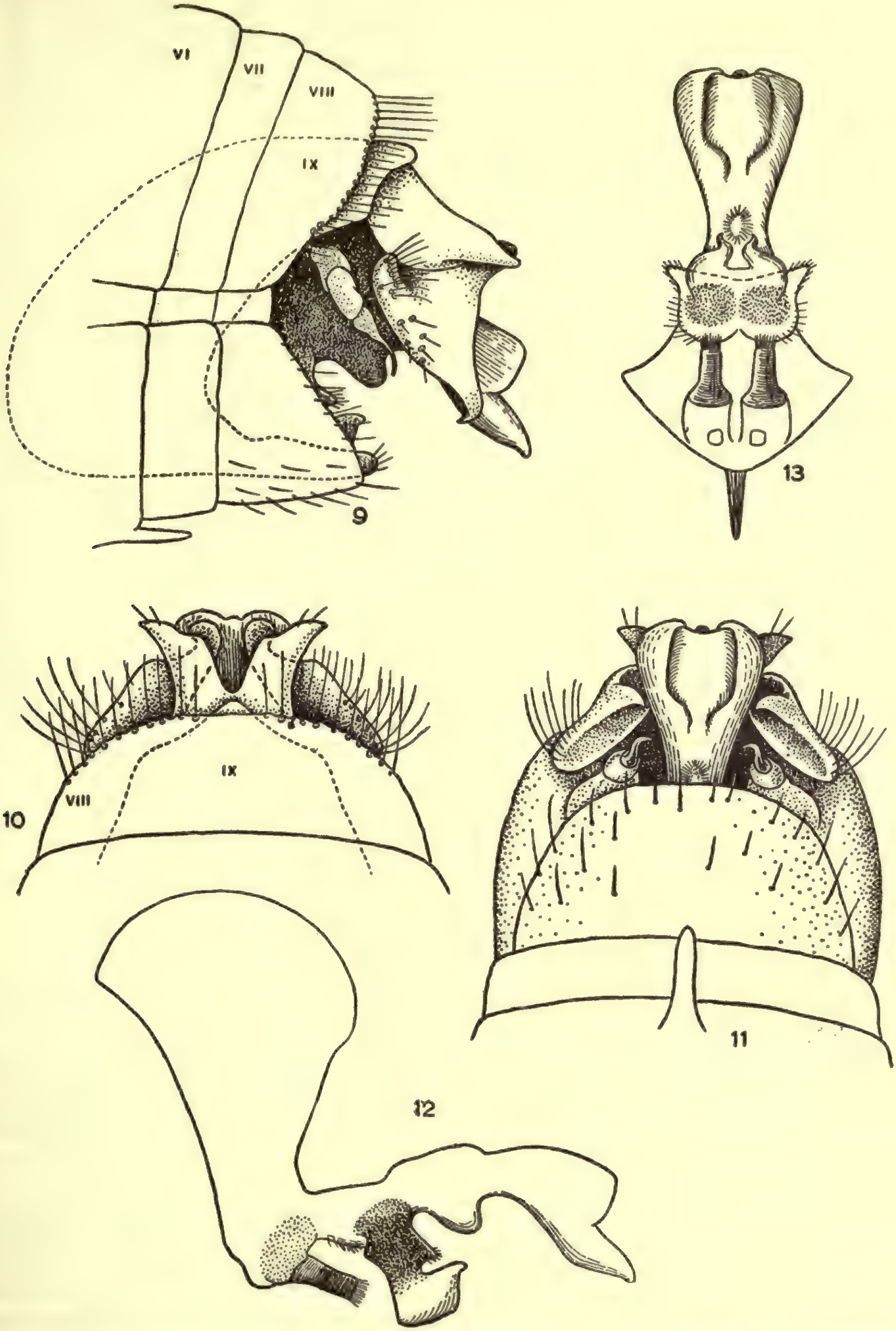
In the wings, the anterior is characterized by an unbroken line of nervures at the anastomosis, and the variation in the neuration seems practically to be confined to the base of apical fork no. 2, where in some species it is narrow and pointed and in others wider and blunt. In the posterior wing, where the neuration is always reduced, there are numerous irregularities in the different species.

A close consideration of the descriptions of the genitalia and neuration given in my papers of Mexican and Brazilian species shows that the genus falls into two groups, in which the presence or absence of penis-sheaths and variations in the base of apical fork no. 2 in the anterior wing may be co-related. Thus what I will term the *locula* group with narrow base to fork no. 2 and penis-sheaths present contains the following species: *locula, piacha, malica, techila, alexanderi, dubitans, resolda.*



FIGS. 4–8. Neuration of posterior wings of 4, *Protoptila cardela,* ♂; 5, *P. delaca,* ♂; 6, *P. piacha,* ♂; 7, *P. techila,* ♂; 8, *P. malica,* ♂.

What I have termed the *liqua* group, with the base of fork no. 2 broad and penis-sheaths absent contains *liqua, guata, tojana, delaca, lorada, rota, salta, cardela. Ixtala* is an exception and here the penis-sheaths are present while the base of fork no. 2 is broad in most of the examples examined. I do not consider these small differences


VI
VII
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Figs. 9–13. *Protoptila locula*, ♂. 9, Genitalia, lateral ; 10, genitalia, dorsal ; 11, genitalia, ventral ; 12, penis, lateral ; 13, penis, ventral.

to be of sufficient value to warrant the separation of the two groups into distinct genera.

Protoptila locula sp. n.

(Figs. 1, 9–13)

Insect brownish, neuration as figured.

Genitalia, ♂. Margin of the eighth tergite truncate, the sternite without the long production found in *P. salta, ixtala, rota* and *resolda*. Ninth segment considerably withdrawn within the eighth, from the side only the dorsal and ventral distal apices being visible. Beyond the margin of the eighth tergite can be seen the centre of the distal margin of the ninth segment, forming a small, triangular projection. Intermediate (?) appendages two-jointed ; from above, basal joint visible as an out-turned, triangular projection, distal joint with a scroll-like head, broadening towards the margin of the eighth segment. Seen from the side, the appendage is directed downward, basal joint with an acute, distally directed apex ; distal joint triangular, directed vertically downward, wide at the base, its apex a pointed, in-turned hook. Penis-sheaths three-jointed, short, terminal joint the longest. Penis very complicated ; from the side with an irregularly-formed distal part, a projecting, blunt hook on the lower margin, and towards the base two pairs of blackened processes, the distal the larger. The basal pair form two short rods with fringed, truncate apices, the distal pair fused to make a plate as shown in the figure. There is the usual enormous, axe-headed extension of the upper surface at the base.

Length of anterior wing, ♂, 2 mm.

Mexico : Guerrera, Cocula, 28.iii.1935, Iguala, 29.iii.1935, 21.i.1936 ; Michoacan, Caracuara, 1197 m., 24–29.iv, 3–5.v.1935, Nocupetara, 9.v.1935 ; Mexcala, 13.xii.1929.

Type, ♂ (microscope preparation), Caracuara, 24–29.iv.1935.

Protoptila piacha sp. n.

(Figs. 6, 14–20)

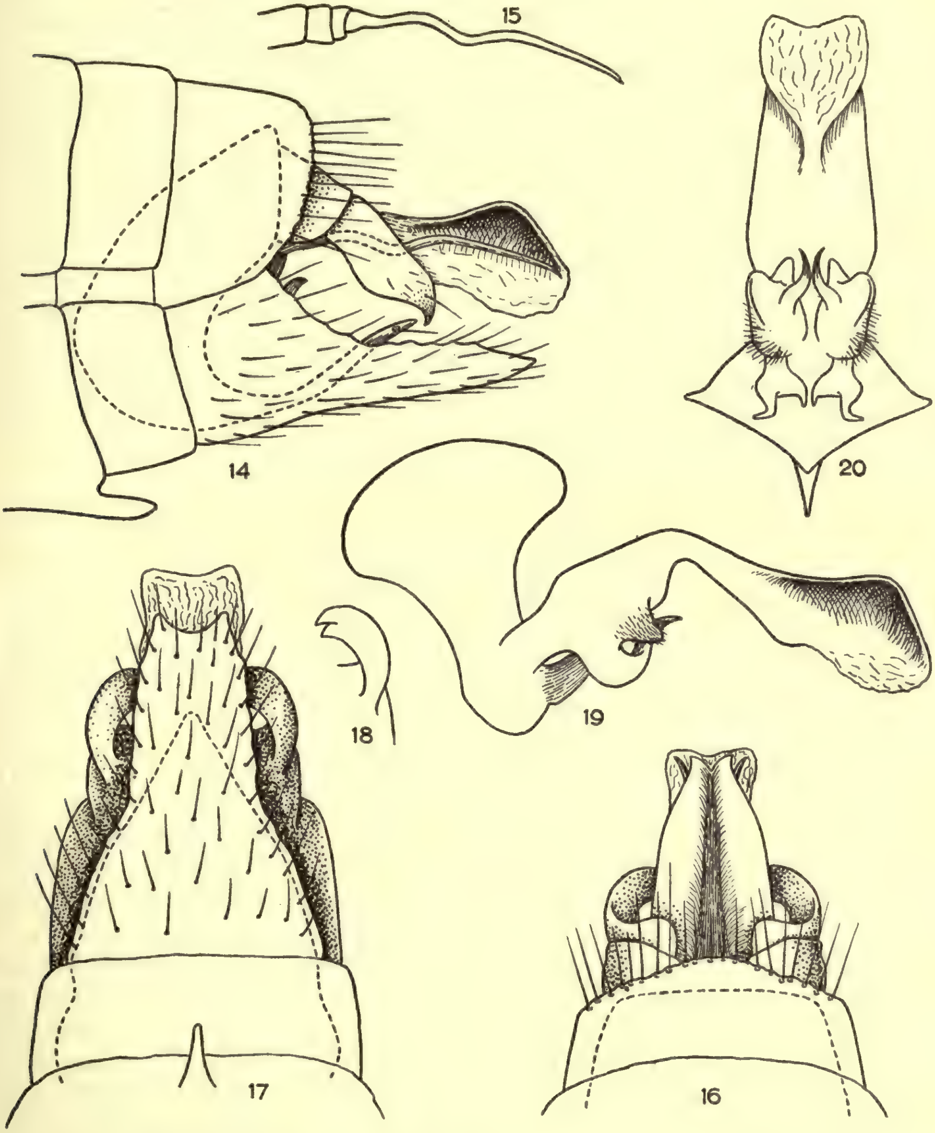
Neuration, posterior wing as figured, anterior as in *P. locula*.

Genitalia, ♂. From above, the margin of the eighth tergite slightly convex and serrate, fringed with long hairs ; sternite strongly produced to nearly as far as the end of the penis, narrowing to a shallowly excised apex, upper margin from the side strongly serrate. Ninth segment almost completely withdrawn within the eighth, only the pointed tip of the ventral margin visible in the side view. Intermediate appendages two-jointed ; from above, basal joint broad and triangular ; terminal joint arises from a broad base and narrows to a pair of bands curling under the penis and, as seen from beneath, with the apices divided in two small forks. From the side, the second joint is long, lower margin sinuous, apex in the form of a down-turned hook. Penis deep, with the distal margin strongly excised, lower portion broad, separated from the upper by a shallow, lateral groove in which lies the penis-sheath. Lower penis-cover as figured. Penis-sheaths with a very long, sinuous terminal joint, basal joints obscure, probably three-jointed.

Length of anterior wing, ♂, 2·25 mm.

MEXICO: Chiapas, Huixtla, 21.xi.1930; Guerrera, Tierra Colorada, 18.xii.1929.

Type, ♂ (microscope preparation), Tierra Colorada, 18.xii.1929.



FIGS. 14–20. *Protoptila piacha*, ♂. 14, Genitalia, lateral; 15, a penis-sheath; 16, genitalia, dorsal; 17, genitalia, ventral; 18, apex of intermediate appendage, dorsal; 19, penis, lateral; 20, penis, ventral.

Protoptila malica sp. n.

(Figs. 8, 21–26)

Neuration of the posterior wing as figured, anterior as in *P. locula*.

GENITALIA, ♂. Distal margin of the eighth segment fringed with stiff hairs, somewhat serrate towards the distal end of the sternite, which projects only slightly beyond the margin of the ninth ventral segment. From beneath, the distal margins of both the eighth and ninth segments are widely excised, the excision of the eighth being more shallow than the ninth ; from above the eighth tergite is slightly and widely excised, the margin of the ninth showing beyond it. From above, the basal joints of the intermediate appendages are large and triangular ; from the side the appendage is directed downward, both joints rectangular, the basal the shorter and with a large, curved, lateral lobe obscuring the connection of the joints. Penis from above broad, apex excised to form two out-turned stout horns ; from beneath, the excision is wider and the distal surface of the apical joint of the intermediate appendage is seen to be densely covered with small corrugations and its upper margin slightly produced to form a hook. Other structures of the penis are shown in the figures, but I am not venturing to suggest their functions nor to name the parts. Penis-sheaths three-jointed and very short, the basal joint much the longest.

Length of anterior wing, ♂, 3 mm.

MEXICO : Colima, 27.i.1930, 1 ♂ (microscope preparation).

Protoptila techila sp. n.

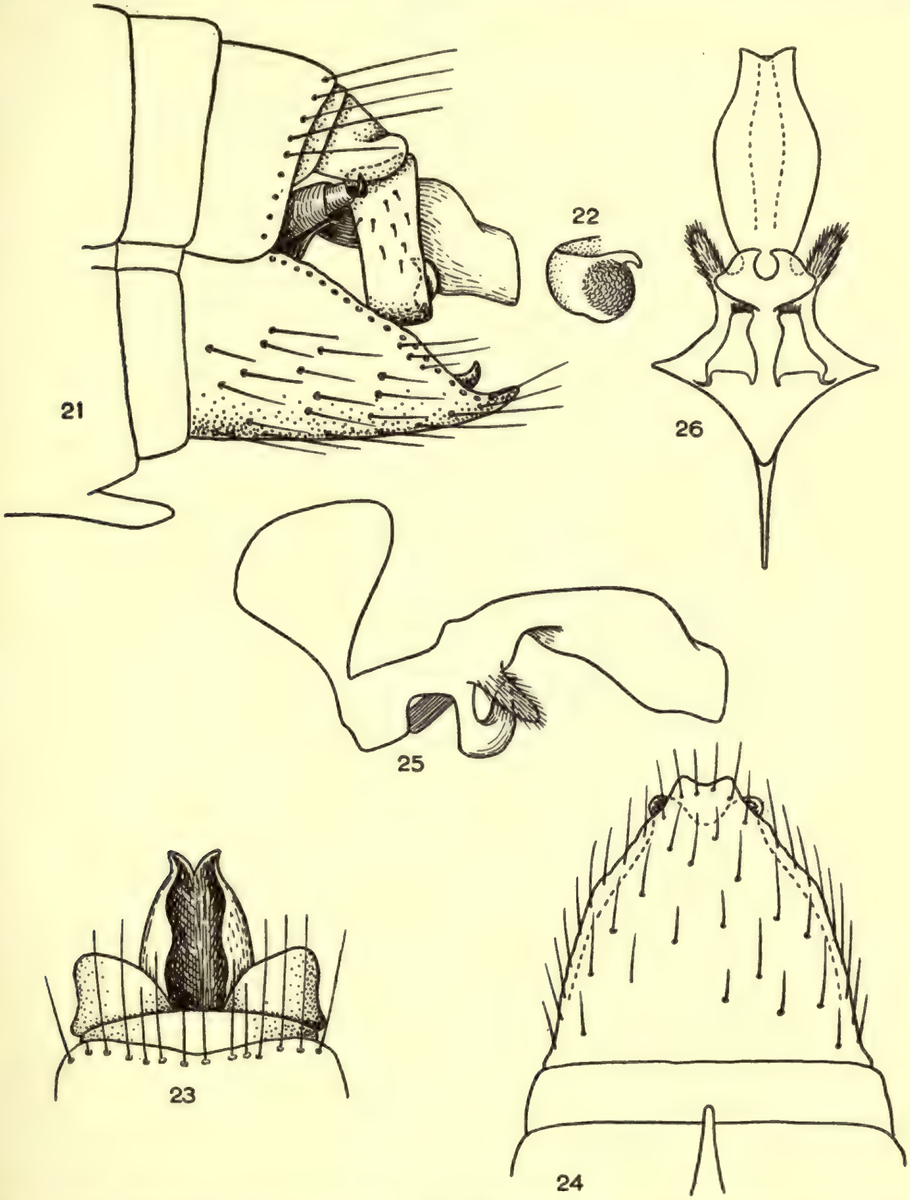
(Figs. 7, 27–31)

Insect brown. Antennae wanting in the single example before me. There are differences in the neuration of the posterior wing between this and other species in the genus, as may be seen by a comparison of the figures. In the anterior wing, neuration is normal and corresponds with that in *P. locula*.

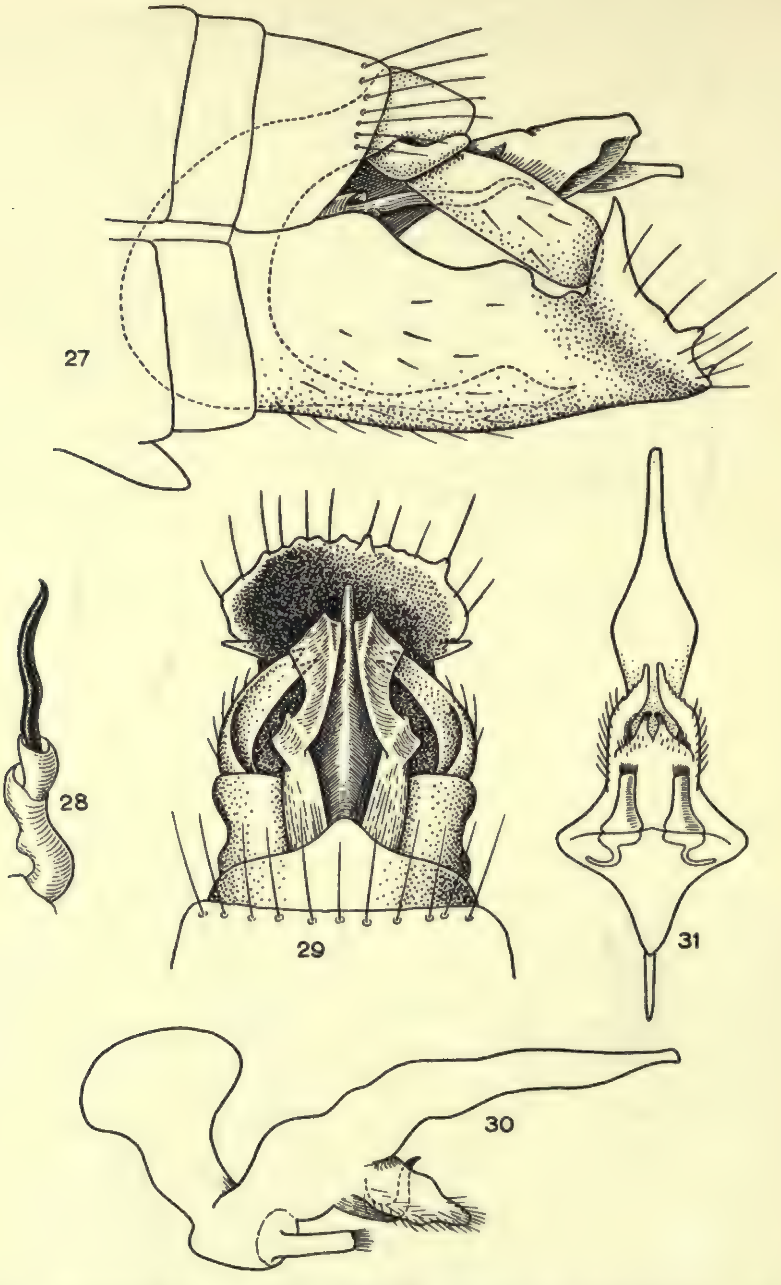
GENITALIA, ♂. Ventral margin of the eighth sternite enormously produced in a wide plate with a serrate distal margin ; from the side the margin is truncate, with the upper angle produced in a strong spur. Ninth segment withdrawn into the eighth, leaving the dorsal portion protruding beyond it so that, from above, it appears with the centre produced in a small, subacute triangle. The ventral margin of the ninth segment is completely concealed within the eighth ; from the side it is much produced and narrows to a sinuous point. The upper penis-cover from above appears as a pair of long, sinuous processes with strongly dentate outer margins, inner margins with angular indentations at the centre. Intermediate appendages two-jointed ; from above, basal joints stout, distal curving inwards with bifurcate apices, the forks short and pointed, the lower the longer. Penis-sheaths three-jointed, terminal joint spine-like and sinuous, second joint the smallest, first joint sinuous. Penis with the usual axe-headed projection of the upper margin at the base ; it is complicated and fashioned after the pattern of *locula*, with various processes on the lower surface (lower penis-cover ?), of which the most conspicuous is a pair of strong, up-turned hooks towards the centre, and at the base a pair of rectangular, distally directed processes with fringed apices.

Length of anterior wing, ♂, 2·5 mm.

MEXICO: Oaxaca, Rio Chiltepec, 21.iii.1932, 1 ♂ (microscope preparation).



FIGS. 21–26. *Protoptila malica*, ♂. 21, Genitalia, lateral; 22, apex of an intermediate appendage, from beneath; 23, genitalia, dorsal; 24, genitalia, ventral; 25, penis, lateral; 26, penis, ventral.

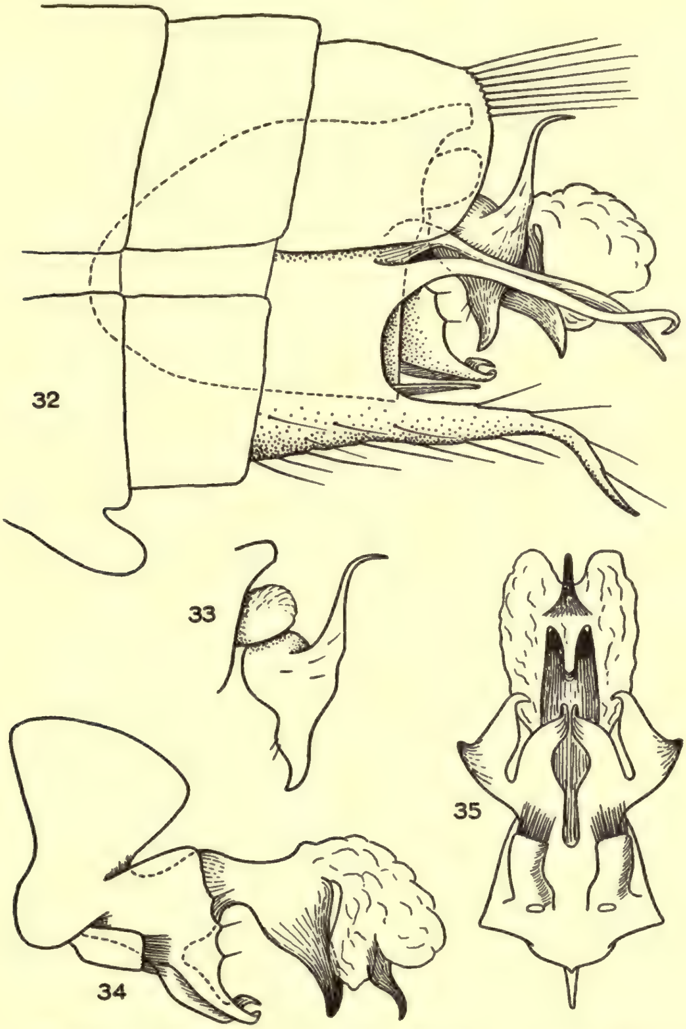


Figs. 27–31. *Protoptila techila*, ♂. 27, Genitalia, lateral ; 28, penis-sheath ; 29, genitalia, dorsal ; 30, penis, lateral ; 31, penis, ventral.

Protoptila alexanderi Ross

Ross, 1941, *Trans. Amer. ent. Soc.* **67** : 48, pl. 2, fig. 14.

Numerous examples of this species were taken in Nuevo Leon, Tamaulipas, 5.vi.1931.



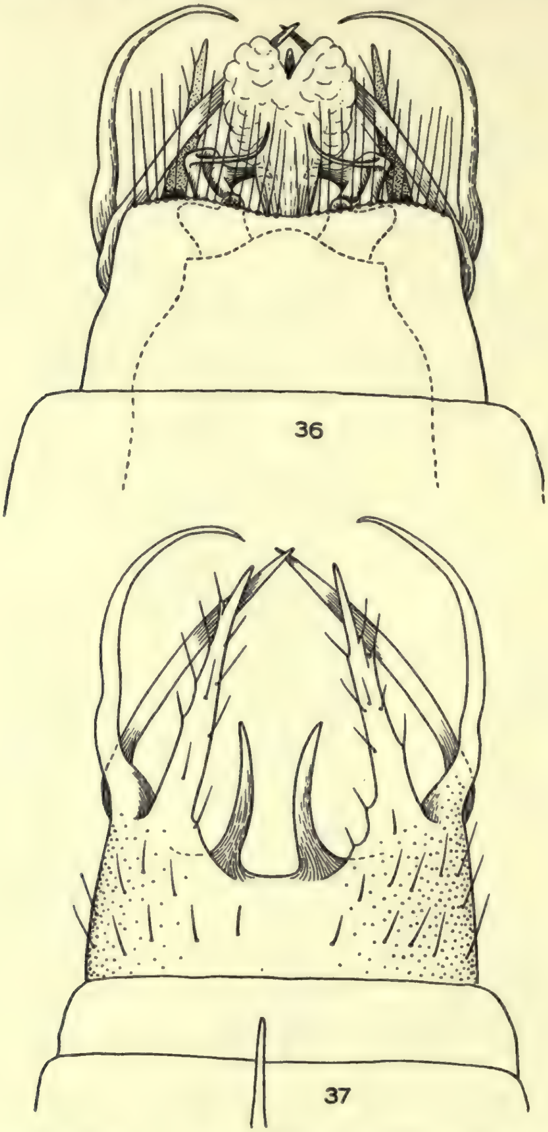
FIGS. 32–35. *Protoptila liqua*, ♂. 32, Genitalia, lateral ; 33, intermediate appendage, lateral ; 34, penis, lateral ; 35, penis, ventral.

Protoptila liqua sp. n.

(Figs. 2, 32–37)

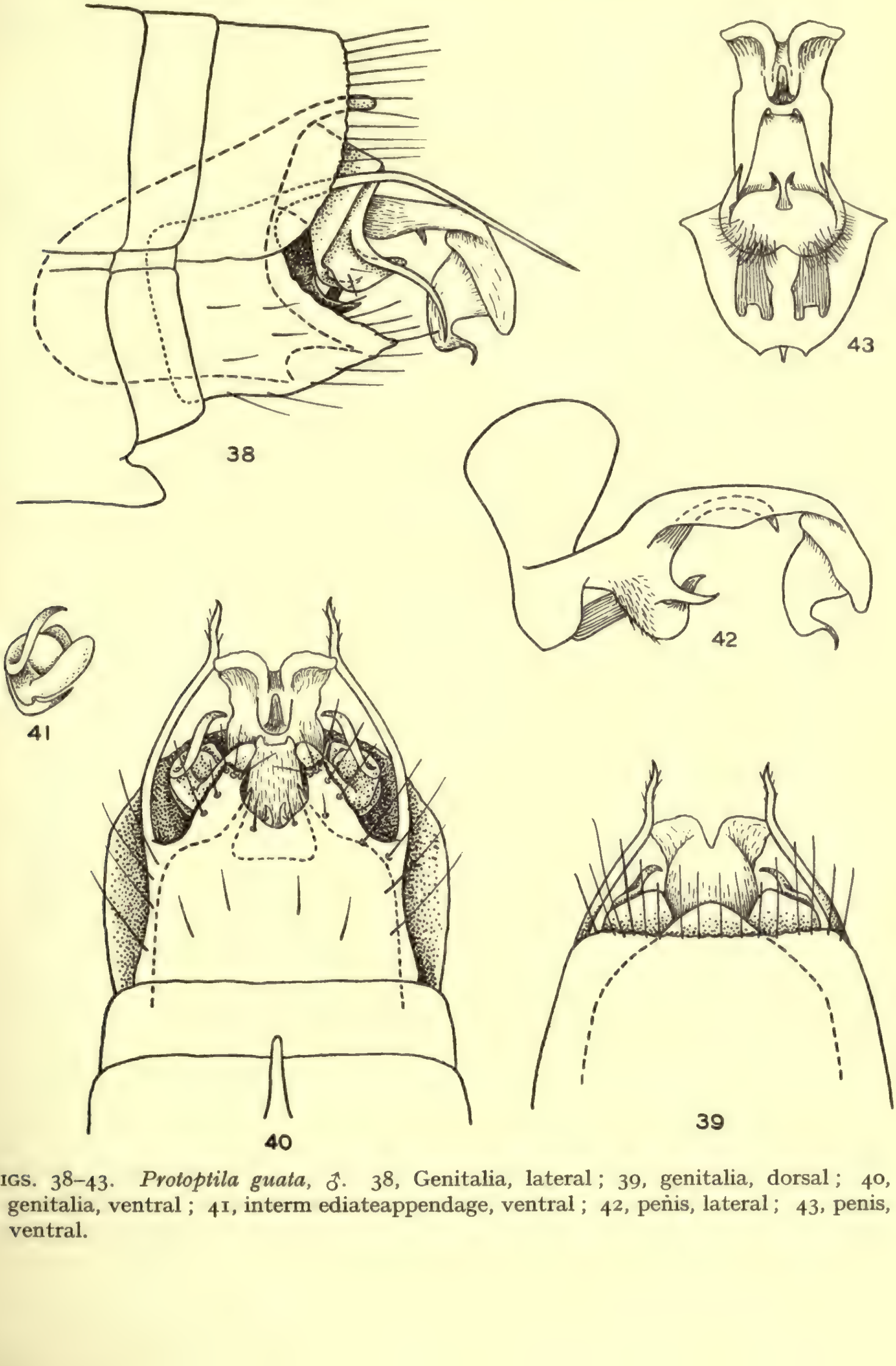
Insect brown. The neuration of the posterior wing differing from that of *P. techila* as shown in the figure.

Genitalia, ♂. Margin of the eighth tergite armed with an evenly and closely arranged fringe of long, stiff hairs. Ninth segment completely withdrawn within the eighth and invisible except in a balsam preparation. Intermediate appendages



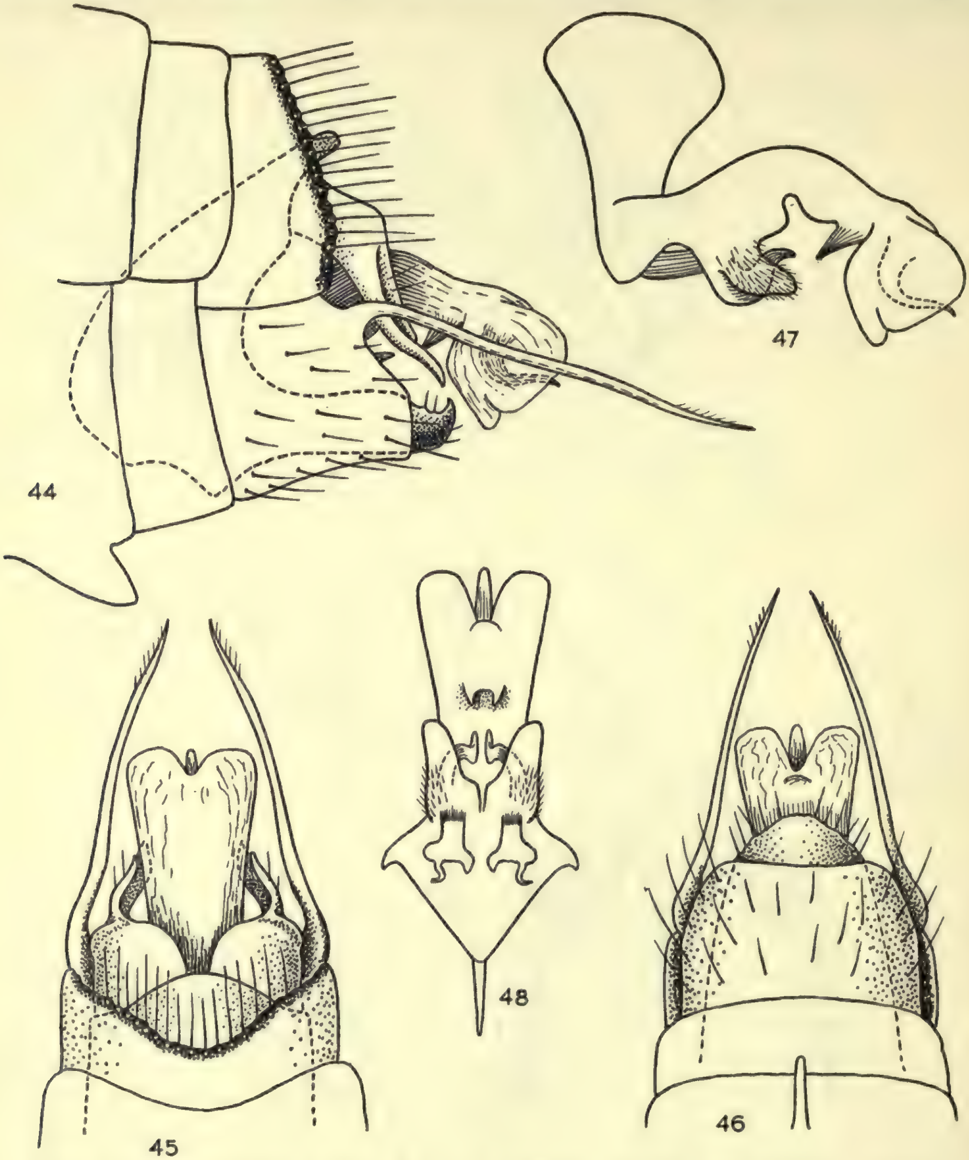
Figs. 36–37. *Protoptila liqua*, ♂. 36, Genitalia, dorsal; 37, seventh, eighth and ninth segments, ventral.

two-jointed, basal joint from above short and wide, terminal joint armed with two strongly chitinized spines, the upper from above sinuous and slender, directed upward, inward and distally, the lower much stouter and directed downward, terminating in an acute beak. Penis with the usual axe-headed extension of the basal upper margin, apex membranous with a pair of large, stout spines at the base of the membrane, directed downward, a single sinuous spine under the apex, also



Figs. 38–43. *Protoptila guata*, ♂. 38, Genitalia, lateral ; 39, genitalia, dorsal ; 40, genitalia, ventral ; 41, interm ediateappendage, ventral ; 42, penis, lateral ; 43, penis, ventral.

directed downward. Towards the base of the penis are two pairs of branches terminating in beak-like apices, the outer directed inwards, the inner distally; still nearer the base is a pair of chimneypot-shaped processes, apices fringed with stiff hairs. Penis-sheaths wanting. Lower margin of the eighth sternite furnished with four pairs of spine-like processes; from beneath, the shortest pair at the centre



FIGS. 44–48. *Protoptila tojana*, ♂. 44, Genitalia, lateral; 45, genitalia, dorsal; 46, genitalia, ventral; 47, penis, lateral; 48, penis, ventral.

with a longer pair outside ; the other two pairs, which are the longest, arise near the pleurite. Seen from beneath, the outer of these lateral pairs is calliper-shaped, the inner straight, directed inwards with the apices touching.

Length of anterior wing ♂, 4 mm.

MEXICO : Liquidamber, 1130 m., 19.iii.1931. La Prusia, 1075 m., 25.iii.1931. *Type*, ♂ (microscope preparation), Liquidamber, 19.iii.1931.

Protoptila guata sp. n.

(Figs. 38–43)

Neuration, anterior wing as in *P. liqua*, posterior as in *P. delaca*.

GENITALIA, ♂. Distal margin of the eighth tergite straight, serrate and fringed with long hairs ; the sternite is produced in a pair of rather short processes with truncate apices separated from each other by a wide excision. The upper angle of the sternite is produced in a long, sinuous spine, sparsely clothed with short hairs towards the apex. Ninth segment with only its upper margin visible, forming a wide, shallow, angular projection from above and a short spur from the side ; lower margin, only to be seen in a cleared specimen, produced in a pair of sharp processes divided from each other by a wide excision. Intermediate appendages two-jointed, basal joint large, in side view with its lower angle produced in an up-curved, sickle-shaped hook ; the second joint is bifurcate, upper fork long, slender and sinuous, curving downward, lower fork stout, curving upward from the side, somewhat sausage-shaped and sloping inwards from beneath. Penis dilated at the apex and excised, with a process on its under surface, wide at the base, terminating in a chitinous hook directed downward. There is a pair of hooks arising about the centre, also on the under side and curving downward. Lower penis-cover as figured. Penis-sheaths wanting.

Length of anterior wing, ♂, 3 mm.

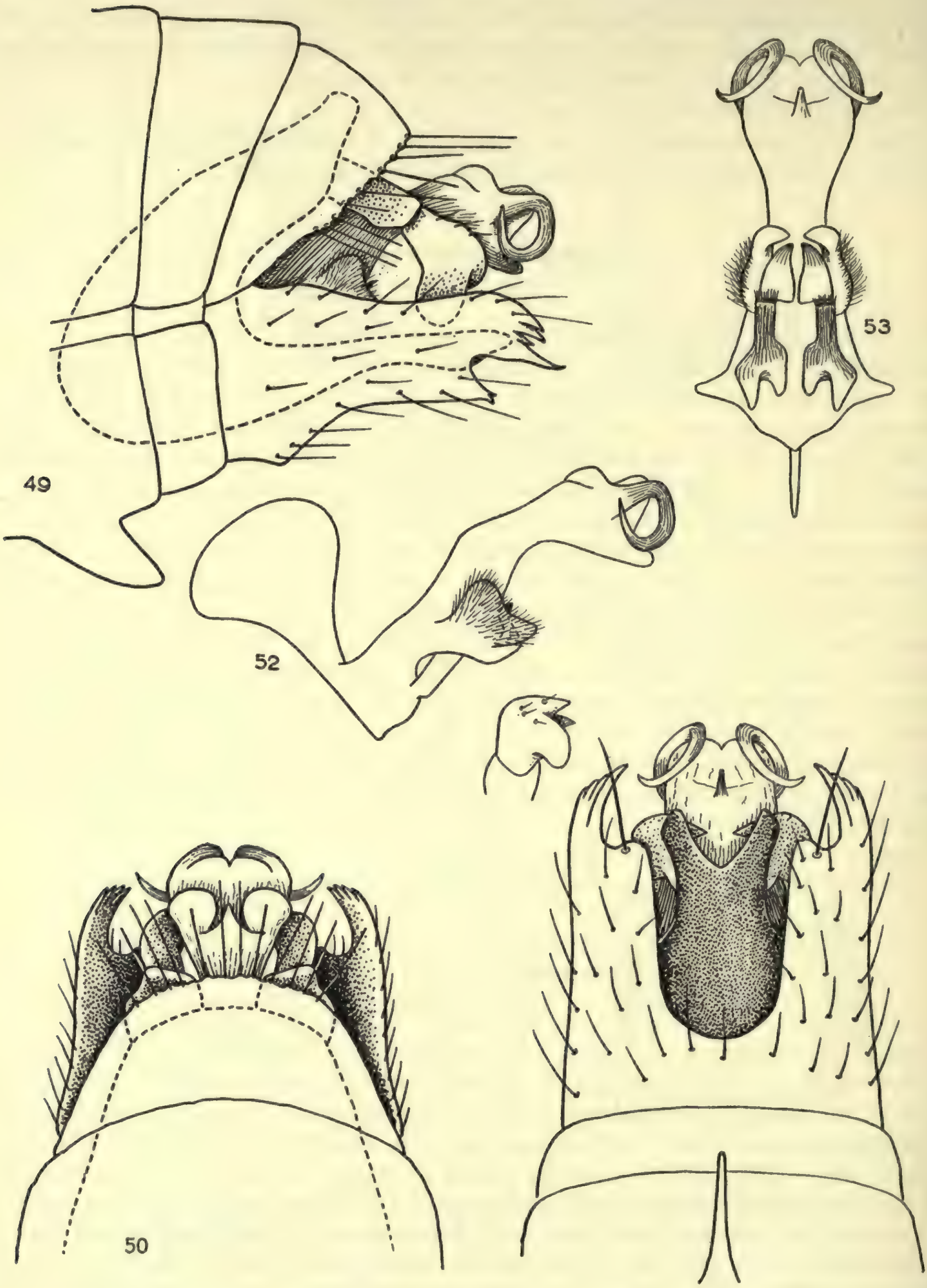
MEXICO : Sinaloa, Badiraguata, 30.iii.1932, 1 ♂ (microscope preparation).

Protoptila tojana sp. n.

(Figs. 44–48)

Neuration, anterior as in *P. liqua*, posterior as in *P. delaca*.

GENITALIA, ♂. Distal margin of the eighth tergite widely and deeply excised to show the rounded distal margin of the ninth segment in the excision ; the margin is strongly fringed, dentate and pigmented. The sternite is only slightly produced beyond the tergite and bears on each lateral margin a very long spine directed distally and sparsely fringed towards the apex ; the distal margin of the segment is not excised but merely slightly concave. Ninth segment partly withdrawn within the eighth to leave just the apical margin above and beneath visible, the upper showing as a blunt knob, the lower as a stout, upwardly directed hook. Intermediate appendages with the terminal joint produced from a broad, stout base in a pair of strongly chitinized, superimposed, sinuous spines, the upper the shorter ; basal



FIGS. 49–53. *Protoptila delaca*, ♂. 49, Genitalia, lateral; 50, genitalia, dorsal; 51, genitalia and apex of intermediate appendage, ventral; 52, penis, lateral; 53, penis, ventral.

joint of the appendage obscure. Penis with a membranous apex containing a hooked spine arising from its under surface; from above and beneath, the penis widens to an excised apex. Lower penis-cover as shown in the figure. Penis-sheaths wanting.

Length of anterior wing, ♂, about 2·5 mm. (wing broken at base).

MEXICO: Chiapas, Jonata, 2.xi.1932, 1 ♂ (microscope preparation).

Protoptila delaca sp. n.

(Figs. 5, 49–53)

Neuration, posterior wing as figured, anterior as in *P. liqua*.

GENITALIA, ♂. Distal margin of the eighth tergite rounded and serrate, fringed with long, stiff hairs. Sternite cleft, forming a wide, deep excision, base rounded, the sides of the excision with truncate apices, of which the outer angles are produced in three or four long, pointed fingers or teeth of varying length. From the side it may be seen that the lowest of these dentate processes is separated from the others by a rounded excision. Ninth segment with the dorsal margin withdrawn into the eighth, ventral margin from beneath appearing in the excision of the eighth as a stout, blackened, bifurcate structure, the apices of the forks obliquely truncate. Intermediate appendages two-jointed, curling down and under the penis; basal joint broad from above, rather long and narrow from the side; terminal joint with a rounded outer lobe and an inner, in-turned spur extending nearly half-way across the penis; a second small spur between this spur and the rounded lobe can be made out in a balsam preparation. Penis from above with the apex dilated in two pairs of superimposed lobes, the upper the smaller; arising from the margin of the lower is a pair of corkscrew spines, the apices directed outwards; from beneath is seen a short central spine directed distally. Lower penis-cover as shown in the figures. Penis-sheaths wanting.

Length of anterior wing, ♂, 3·5 mm.

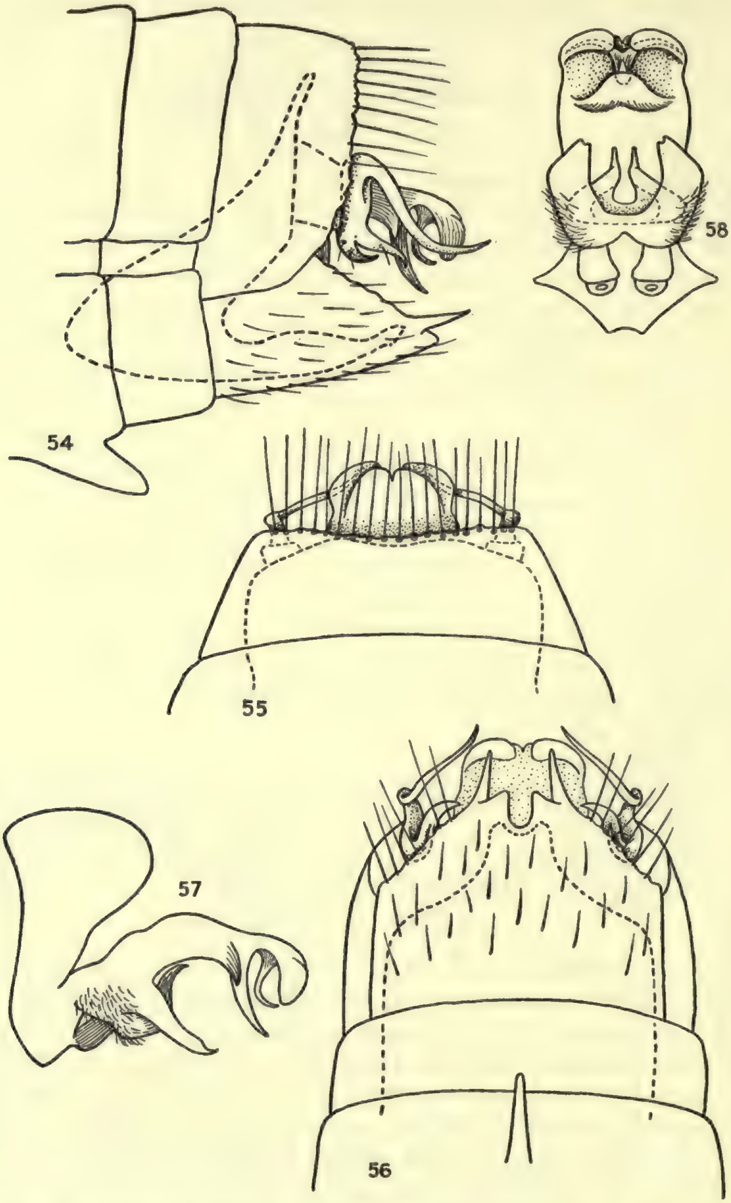
MEXICO: Vera Cruz, Cardel, 3.viii.1932, 1 ♂ (microscope preparation).

Protoptila lorada sp. n.

(Figs. 54–58)

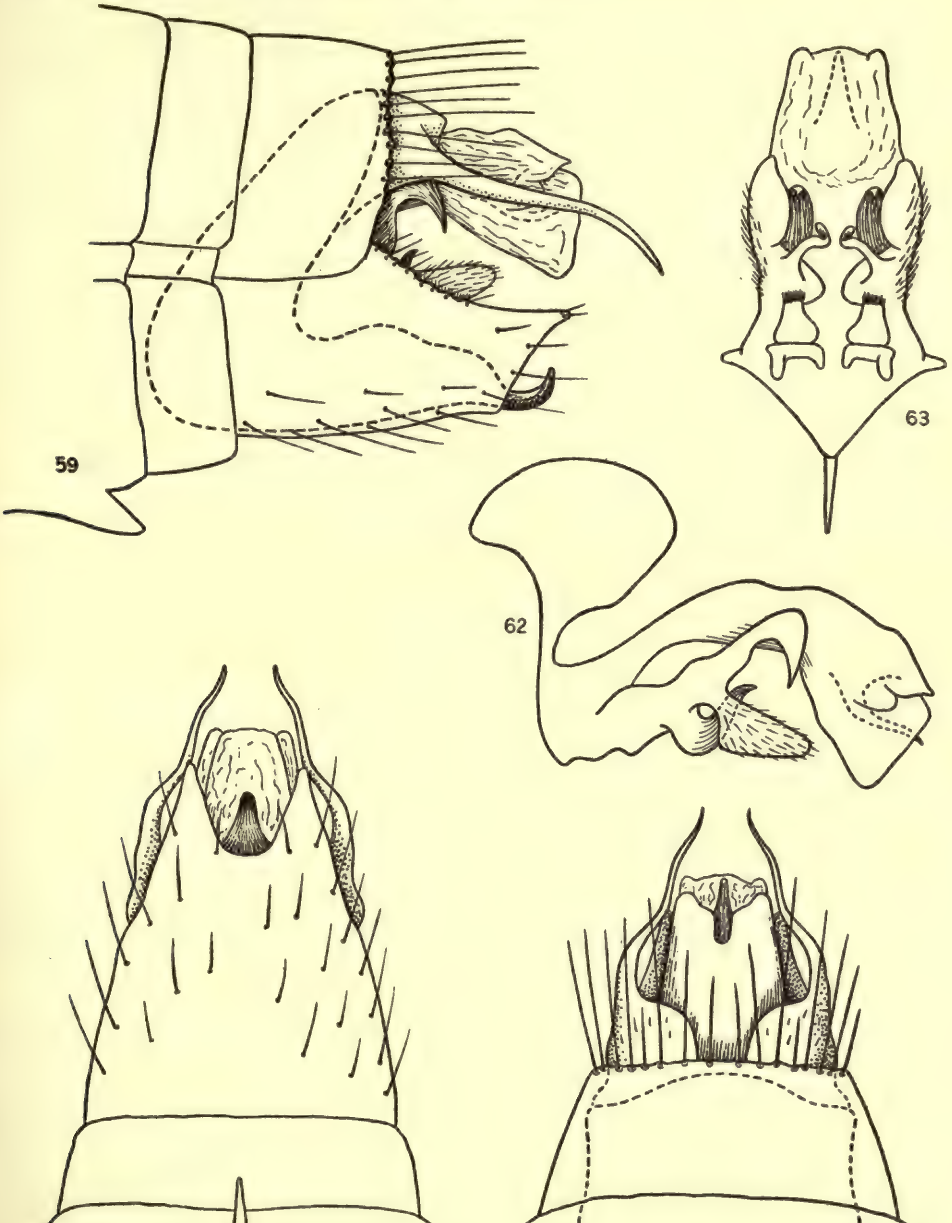
Neuration, anterior wing as in *P. liqua*, posterior as in *P. cardela*.

GENITALIA, ♂. Eighth tergite with the distal margin straight and slightly dentate; the margin of the sternite with a narrow, rounded and not very deep excision, near which it is produced in a pair of shortish and very acute projections or spurs. Ninth segment entirely withdrawn into the eighth; in a cleared preparation, the dorsal margin is undulating, ventral produced at its centre and shallowly excised at the centre of the produced portion. Intermediate appendages two-jointed, basal joint somewhat rectangular, apical joint bearing three sinuous spines of which the upper is the longest and, from the side, rather widely separated from the two lower. Penis with a membranous, excised apex, armed on its lower surface, as seen from the side, with three stout spines, of which the most distal is considerably curved, the central longer and nearly straight, the basal short and beak-like. Structures towards the base, including two more hooked processes, probably form part of the lower penis-cover. Penis-sheaths wanting.



FIGS. 54–58. *Protoptila lorada*, ♂. 54, Genitalia, lateral; 55, genitalia, dorsal; 56, genitalia, ventral; 57, penis, lateral; 58, penis, ventral.

Length of anterior wing, ♂, 2·25 mm.
MEXICO: Guerrera, Tierra Colorada, 18.xii.1929.
Type, ♂, mounted as a microscope preparation.



FIGS. 59–63. *Protoptila cardela*, ♂. 59, Genitalia, lateral; 60, genitalia, dorsal; 61, genitalia, ventral; 62, penis, lateral; 63, penis, ventral.

Protoptila cardela sp. n.

(Figs. 4, 59–63)

Neuration, posterior wing as figured, anterior as in *P. liqua*.

Genitalia, ♂. Ninth segment only visible as a small ventral hook, the remainder being completely withdrawn into the eighth. The dorsal margin of the latter is straight, fringed with very long hairs ; from beneath it is deeply excised to leave prominent outer angles separated by a deep, round-based excision. From the side the distal margin is obliquely truncate, the extreme distal angle appearing considerably above the hooked termination of the ninth segment. Intermediate appendages unusual in construction, apparently single-jointed, with a broad base, lateral outer angle produced in a very long, sinuous spine. Penis from above broad and rectangular, upper surface with the apex excised, lower surface projecting beyond it ; imbedded in the membranous apex is a sinuous spine arising form a broad base. Other structures of the penis, possibly a complicated form of lower penis-cover, as shown in the figures. Penis-sheaths wanting.

Length of anterior wing, ♂, 2·75 mm.

Mexico : Vera Cruz, Cardel, 3.viii.1932, 1 ♂ (microscope preparation).

A very unusual form of *Protoptila*, with no apparent penis-sheaths and a single-jointed intermediate appendage.

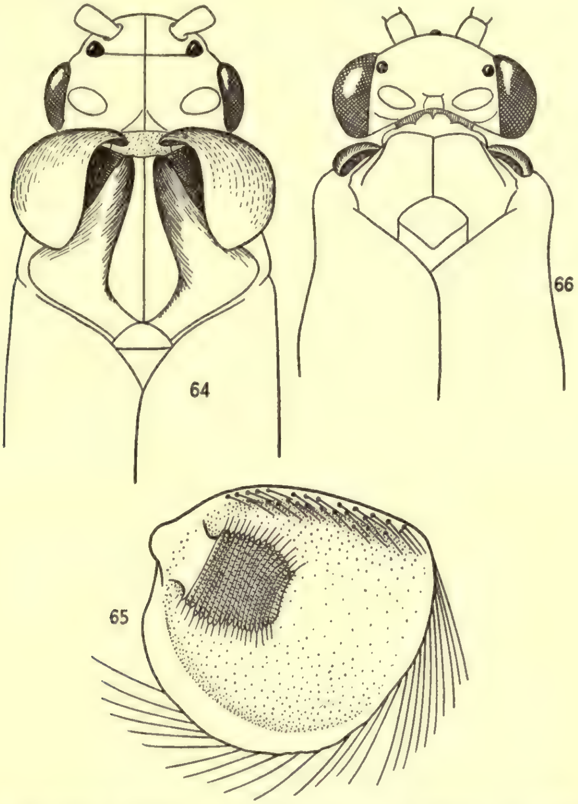
Culoptila gen. n.

(Figs. 64–66)

This genus has so far only been recorded from Mexico. Its most striking feature is the development of the tegulae, which are enlarged in the male from mere plates to huge caps, containing at their bases concertina-shaped structures which probably function as scent-organs. Whilst such structures are generally extensile or eversible, I believe that in *Culoptila* the organ is fixed as in the shape shown in the figure. The material at my disposal is plentiful and in the large number of examples passed through KOH, there is no sign of any expansion or extension of the structures. As may be seen in the figures, the edges of the folds are armed with bristles. *Culoptila* may also be distinguished from *Protoptila* and other genera in the group by the neuration and characters of the genitalia.

In the anterior wing, forks nos. 1, 2, 3 and 4 are present, fork no. 4 being absent in *Protoptila* and other allied genera. As with these allied genera, there is a short row of stiff bristles arising from the posterior edge of Cu_2, which is considerably thickened. In the posterior wing the neuration is variable and possibly even occasionally aberrant, as is shown in the figures of *C. aluca*. Ocelli present. Spurs 0, 4, 4. There is always a prolongation of the upper distal margin of the ninth segment covering a pair of in-turned hooks of varying shape. There is a large, shield-shaped upper penis-cover. The penis is very obscure ; there are, in every species, two black spines of unequal length and the presence of an apparent duct at the base of one of them suggests that these may be penis and sheath. The structure which

I have doubtfully termed the lower penis-cover is in all species bifurcate, and in cleared examples is seen, in the side view, to be connected far back in the fifth segment with the upper penis-cover. The ventral process of the sixth sternite is peculiar in shape in all species and from the side is seen as a rounded or oval lobe attached to the sternite by a short stem.



Figs. 64–66. 64, Head and thorax of *Culoptila aluca*, ♂, dorsal ; 65, tegula of *C. aluca*, ♂, showing scent-organ ; 66, head and thorax of *Allotrichia pallicornis* Eaton.

Type species, ***Culoptila aluca*** sp. n.

Culoptila aluca sp. n.

(Figs. 67–69)

Insect brownish, neuration as figured.

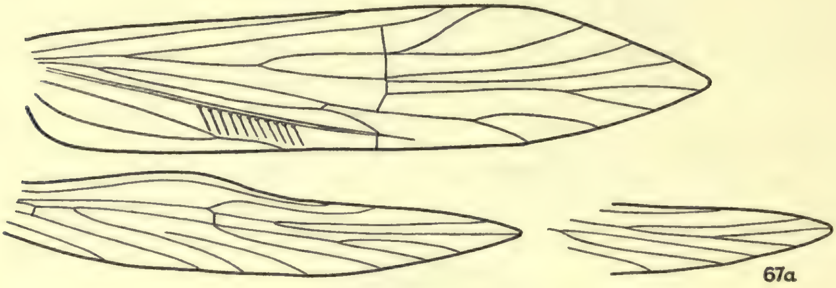
Genitalia, ♂. Ninth dorsal segment produced. Beyond it there is a large dorsal plate which, from above, entirely obscures the genitalia. Arising from its underside, near the base, is a down-turned process terminating in a bifurcate apex, outer fork long and down-curved, inner rounded, armed at its apex with a few bristles.

There is a very large, shield-shaped upper penis-cover and a pair of asymmetric spines, the longer of which may be the penis, the shorter its sheath. At the centre of the margin of the eighth sternite is a process which may be the lower penis-cover, with outer wings and a central plate bearing, on each side, a blunt projection of its apical margin, armed with a pair of bristles. Inferior appendages (?) short, slightly curved.

Length of anterior wing, ♂, 2 mm.

MEXICO : Guerrera, Cocula, 28.iii.1935, Tierra Colorada, 18.xii.1929 ; Michoacan, Caracuaro, 1197 m., 24–29.iv, 3–5.v.1935, Nocupetaro, 9.v.1935 ; Huetamo, 8.vii. 1935.

Type, ♂ (microscope preparation), Caracuaro, 24–29.iv.1935.



FIGS. 67–67a. *Culoptila aluca*, ♂. Wings; 67*a*, apex of posterior wing of another example.

Culoptila amberia sp. n.

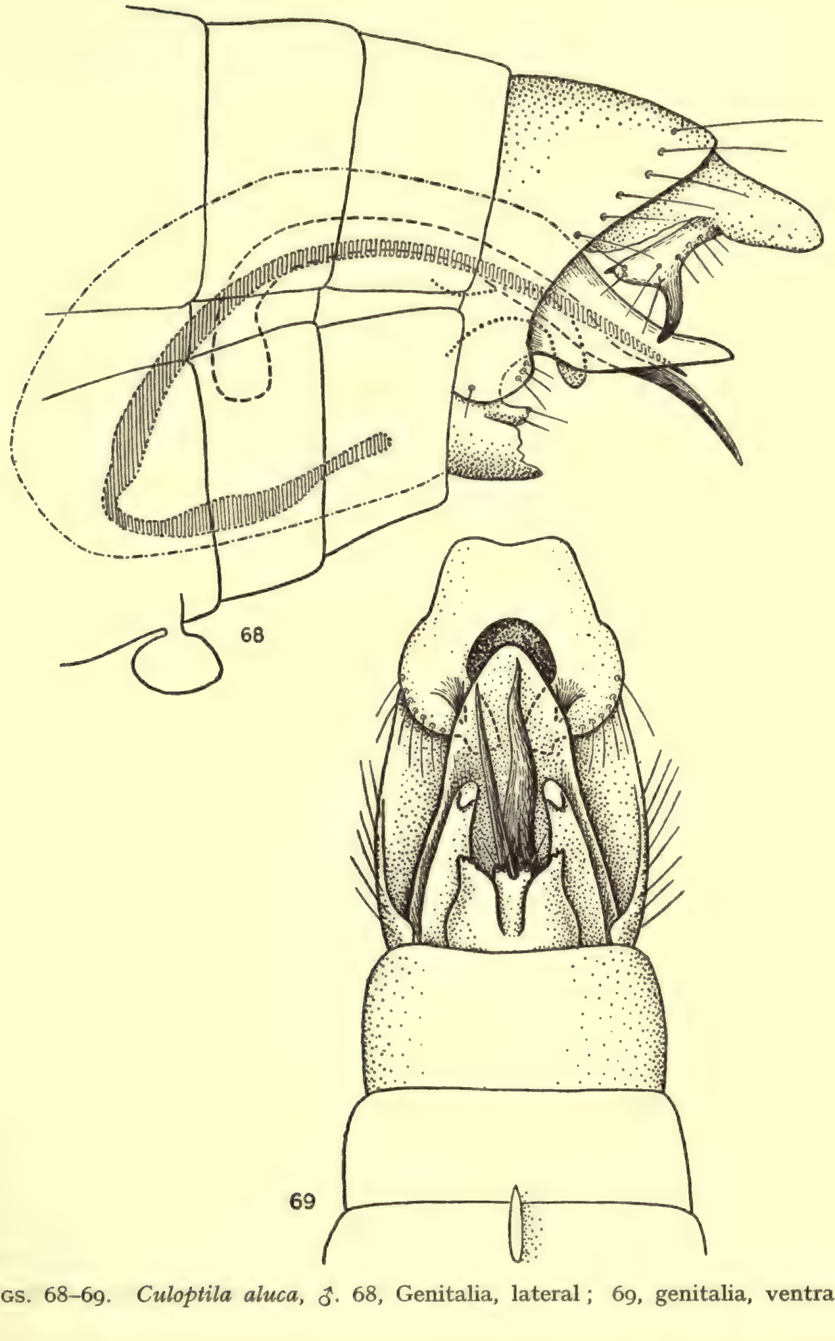
(Figs. 70–72)

Anterior wing as figured, both posterior wings too incomplete for description.

GENITALIA, ♂. Ninth segment extending downwards only slightly below the pleurite of the eighth. Dorsal plate produced, apex truncate, directed downward in side view ; from its underside arises a pair of stout, in-curving hooks with their sub-acute apices nearly meeting. Upper penis-cover from beneath wide at the base, becoming somewhat abruptly sub-acute at the apex, the formation of the structure obscure ; from the side it is broad, with a truncate apex and there are indications that it may consist of two structures superimposed. Penis and sheath in the form of two blackened spines, the longer being probably the penis. Inferior appendages invisible except in cleared material ; they lie above what I suppose to be the lower penis-cover and are short and sinuous, curving slightly outward as seen from beneath. Lower penis-cover consisting of a pair of large arms separated from each other by a wide, rounded excision, each apex armed with one or two stout bristles.

Length of anterior wing, ♂, 2·75 mm.

MEXICO : Liquidamber, 19.iii.1931, 1 ♂ (microscope preparation).



FIGS. 68–69. *Culoptila aluca*, ♂. 68, Genitalia, lateral ; 69, genitalia, ventral.

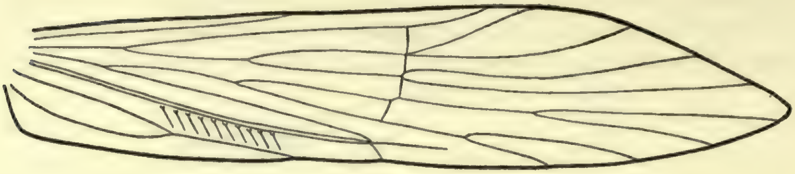
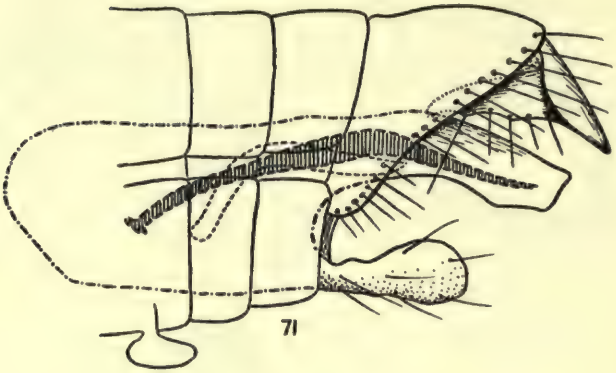
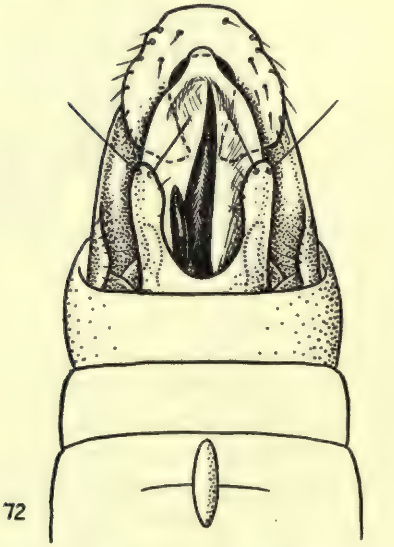


FIG. 70. *Culoptila amberia*, ♂. Anterior wing.





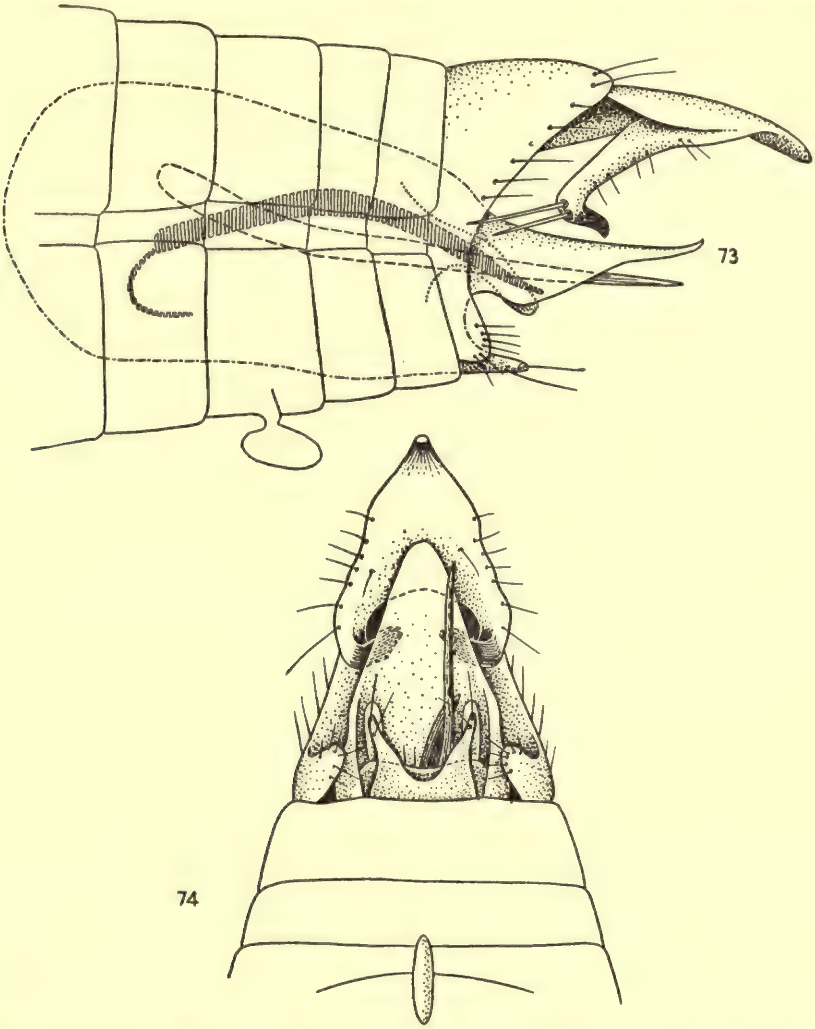
FIGS. 71–72. *Culoptila amberia*, ♂. 71, Genitalia, lateral; 72, genitalia, ventral.

Culoptila rusia sp. n.

(Figs. 73–74)

Insect brownish, neuration as in *C. aluca.*

Genitalia, ♂. Dorsal plate much produced and very narrow at the sub-acute apex, which is directed slightly downward ; at the base, on the underside, are two large, in-curving hooks or processes with blackened apices, sinuous from the side.



Figs. 73–74. *Culoptila rusia,* ♂. 73, Genitalia, lateral ; 74, genitalia, ventral.

Upper penis-cover shield-shaped, apex sub-acute, from the side with the lower margin produced downward in a large triangular flap, apex produced and acute. Penis and sheath in the form of two blackened spines, the shorter being probably the penis. Inferior appendages short, curving downward. Lower penis-cover with a pair of widely divergent, lateral arms and a quadrate plate dimly seen beneath it.

Length of anterior wing, ♂, 2 mm.

MEXICO: La Prusia, 1075 m., 25.iii.1931; Belisario, Dominguez (San Geronimo), Chiapas, 6.v.1935. (The place is situated near the swift-running Huixtla River, with cataracts and waterfalls.)

Type, ♂ (microscope preparation), La Prusia, 25.iii.1931.

Culoptila saltena sp. n.

(Figs. 75–76)

Neuration as in *C. aluca.*

GENITALIA, ♂. Ninth segment produced dorsally, slightly shallower than the eighth, lower distal margin terminating in a rounded knob as seen from the side. There is a dorsal plate which, from beneath, is seen to bear on the under surface two in-turned claws enclosing an oval space. Apical margin of the plate arises from a narrowish stem, broadened towards the distal, truncate margin, of which the upper angle is produced in a sharp spur, lower forming an inwardly directed hook. Upper penis-cover shield-shaped as in *C. aluca.* There are two black, asymmetric spines, of which the longer is probably the penis. Inferior appendages short and curved. Lower penis-cover broad, with divergent, narrow, triangular, lateral arms, apices notched from the side; behind it a quadrate plate whose excised distal margin appears between the arms.

Length of anterior wing, ♂, 2mm.

MEXICO: Huixtla, 21.xi.1930; Saltenango de la Paz, 15.iii.1931; Morelos, Cuernovaca, 1542 m., southern slopes of the Central Tableland, many brooks in deep-cut valleys, 8–11.vi.1932.

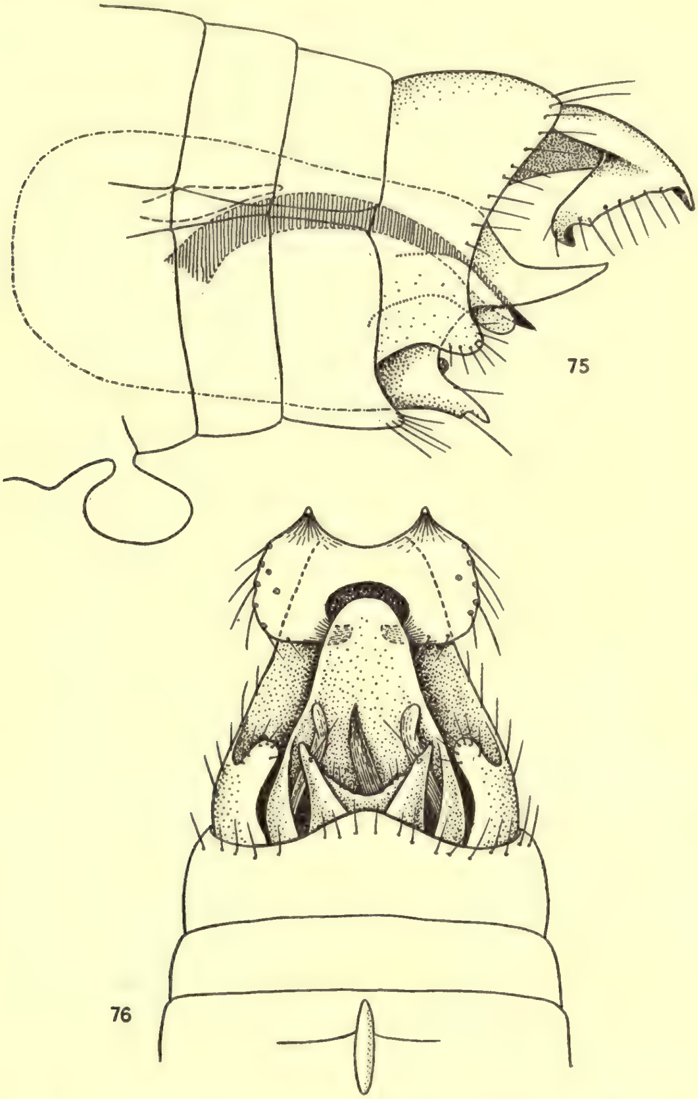
Type, ♂ (microscope preparation), Huixtla, 21.xi.1930.

Mexitrichia meralda sp. n.

(Figs. 77–79)

Insect very similar in general appearance and neuration to *M. leroda* Mosely.

GENITALIA, ♂. To the margin of the ninth dorsal segment is jointed a large plate, probably fused superior appendages, with a rounded excision of the distal margin, the outer angles produced, blackened and incurved like a pair of horns. From the side the plate is wide at the base, with a sinuous lower margin, the upper being straight until it approaches the apex, where it is abruptly bent downward; the apex of the plate terminates in a blackened, distally and slightly downwardly directed beak. Upper penis-cover long, spine-like, straight from above, curving slightly upwards from the side, with a slightly thickened base. Penis broad and fleshy, not exserted in the type as is shown in *leroda;* the two terminal black spines, so conspicuous in *leroda*, are doubtfully shown in *meralda* and appear to be directed basally. Sheaths long, somewhat ribbon-shaped. Lower penis-cover from below with two outstanding wings as in *leroda*, and a very long, twisted spine arising from the centre and extending beyond the penis; the surface is covered throughout its length with a few small teeth.

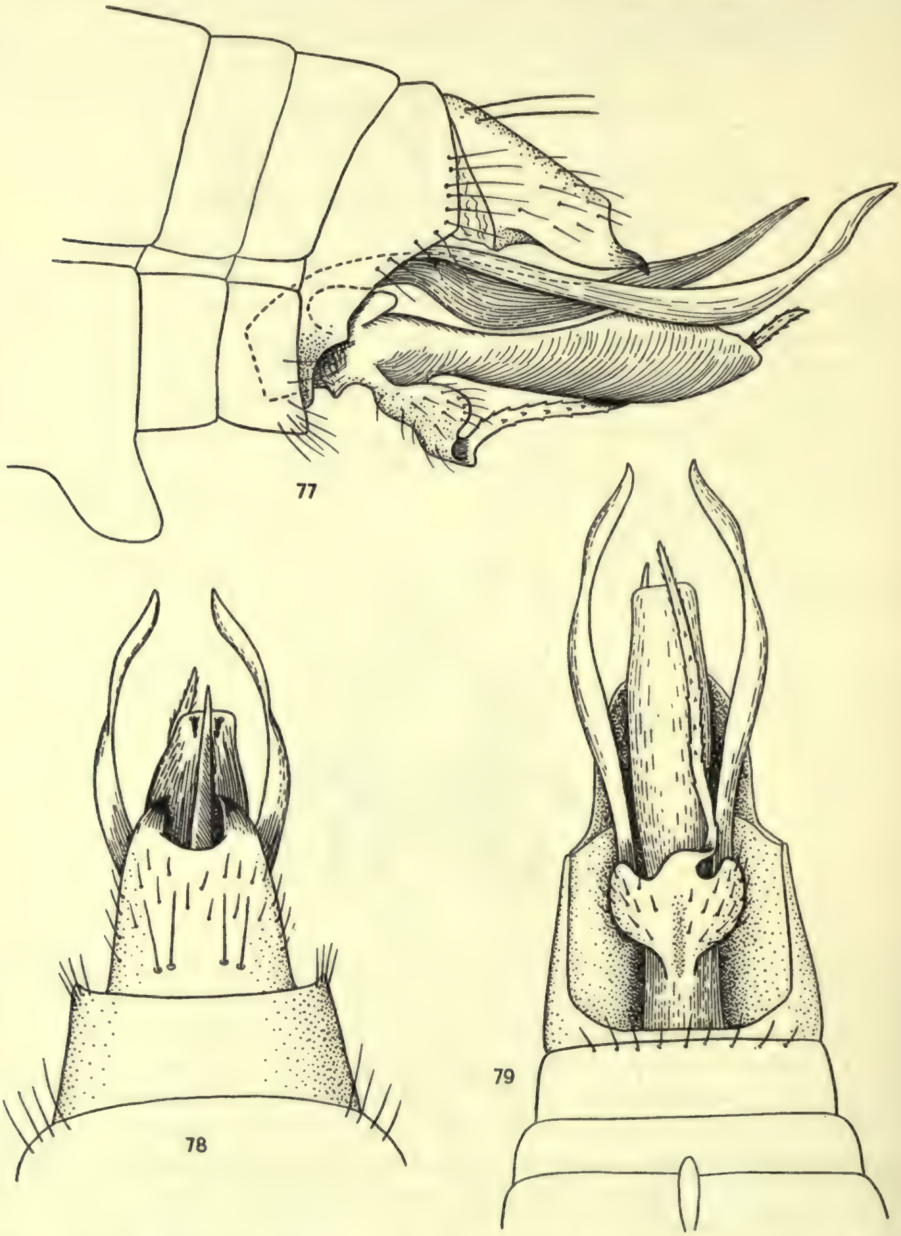


Figs. 75–76. *Culoptila saltena*, ♂. 75, Genitalia, lateral; 76, genitalia, ventral.

Length of anterior wing, ♂, 3 mm.

Mexico: Huixtla, 21.xi.1930; Esmeralda, 545 m., 19.xi.1930; Morelos, 7, 21.iv.1932 ; Montecristo de Guerrero, 11.iii.1931 ; Michoacan, Caracuaro, 25.iv.1935.

Type, ♂ (microscope preparation), Huixtla, 21.xi.1930.



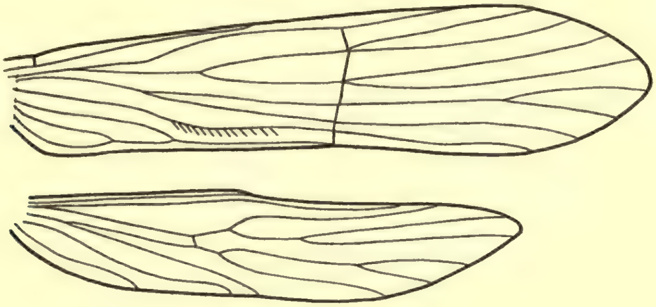
Figs. 77–79. *Mexitrichia meralda*, ♂. 77, Genitalia, lateral ; 78, genitalia, dorsal ; 79, genitalia, ventral.

Mexitrichia rancura sp. n.

(Figs. 80–86)

Insect brown. In the neuration there are slight differences between *rancura* and the type species *leroda* as shown in the figure.

GENITALIA, ♂. Dorsal margin of the ninth segment widely excised as in *leroda*. Beyond it is jointed a large plate, apical margin above produced at its centre in an acute triangle, sides bent downward, with acute, blackened apices which, from the side, appear as a beak-like hook directed downward ; from this aspect, the produced centre of the plate appears as a large, distally directed beak. Upper penis-cover long, from the side sinuous, from above broadened before the apex. Penis very broad, roughly oblong from the side, from beneath strongly constricted at the middle, tapering from a broad base ; arising towards its apex is a pair of laterally outstretched, short, curved horns, densely covered with minute setae. There are two sinuous and strongly chitinized spines, shaped like staples, back to back on each side of the penis. These may be penis-sheaths ; their attachment to the penis and lower penis-cover is very obscure. Lower penis-cover with outstretched wings as in the other species of the genus, but with no apparent central spine in the single example available.



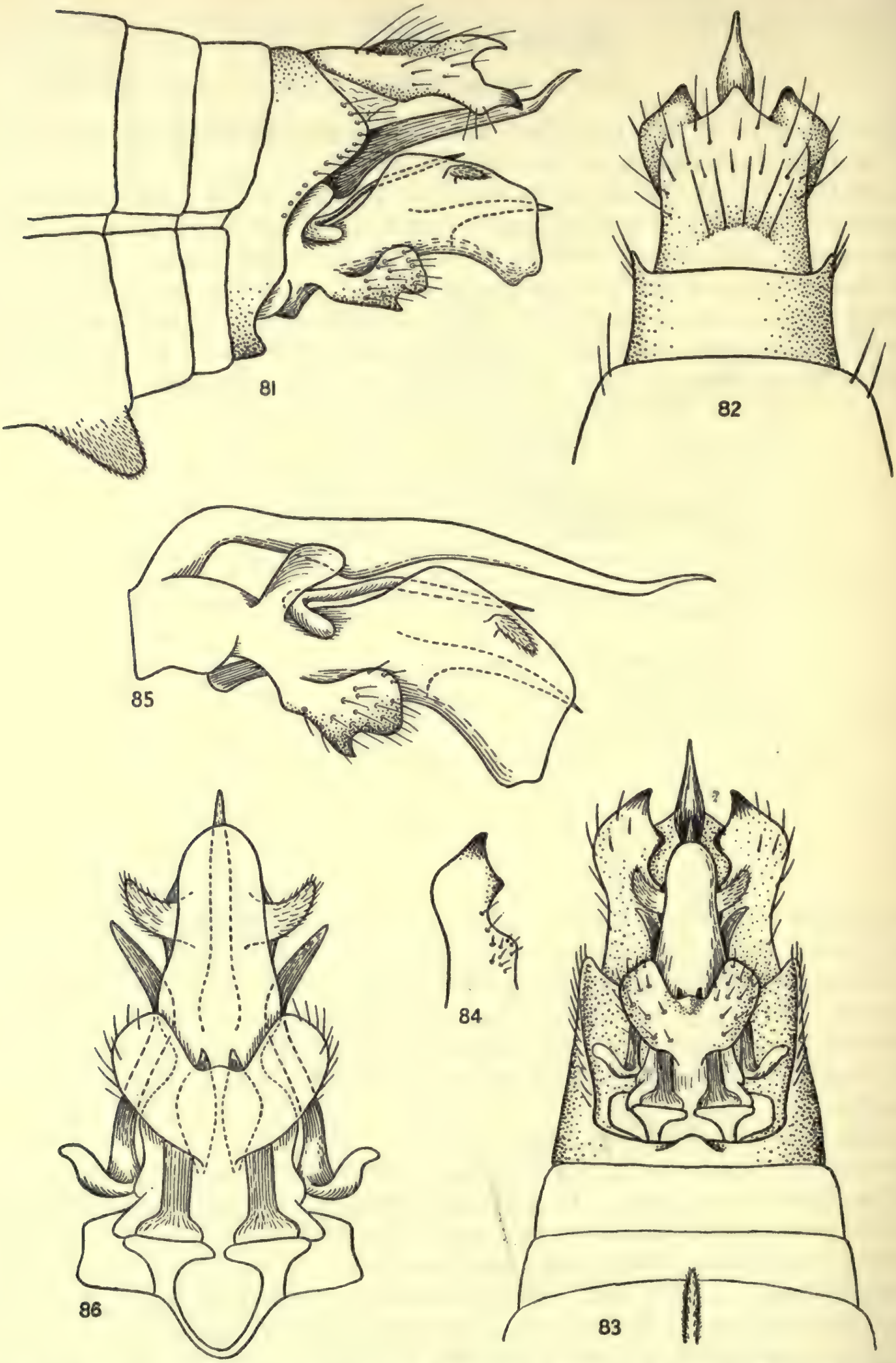
80

FIG. 80. *Mexitrichia rancura*, ♂. Wings.

Length of anterior wing, ♂, 4 mm.

MEXICO : Barranca Honda, 24.ii.1931, 1 ♂ (microscope preparation).

In the figures of the species, I have included certain structures apparently connected with the penis and the lower penis-cover. These structures are very obscure as to their attachments. They appear also in *meralda*, but as in this species they are even more obscure, I have omitted to figure them or to refer to them in the description of either species. I believe that homologous structures, equally obscure, occur also in the genera *Protoptila* and *Culoptila*. It is perhaps beyond the scope of this purely taxonomic paper to deal with these anatomical features.



FIGS. 81–86. *Mexitrichia rancura*, ♂. 81, Genitalia, lateral; 82, genitalia, dorsal; 83, genitalia, ventral; 84, lateral portion of dorsal plate, ventral; 85, penis with its upper and lower covers, lateral; 86, penis with upper and lower covers, ventral.

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A REVIEW OF THE *AEDES SCUTELLARIS* SUBGROUP WITH A STUDY OF VARIATION IN *AEDES PSEUDOSCUTELLARIS* (THEOBALD)

(DIPTERA : CULICIDAE)

ELIZABETH N. MARKS

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ELIZABETH N. MARKS
(Department of Entomology, Queensland University)

Pp. 347–414 ; Plate 18 ; 19 *Text-figures* ; 1 *Map*

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By ELIZABETH N. MARKS M.Sc. (Qld.), Ph. D. (Cantab.), F.R.E.S.

(*Department of Entomology, Queensland University*)

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SYNOPSIS

Eighteen described and three undescribed members of the *Aedes scutellaris* subgroup are recognized from the Australasian region and eastern part of the Oriental region. The systematic status accorded to members is reviewed, the diagnostic specific characters critically examined, and the geographical distribution of the subgroup illustrated and discussed.

An original pictorial chart for identification of members of the subgroup indicates also the geographical distribution of various taxonomic characters, the implications of which are considered. The general trend is from west to east but one character shows a north-south distribution. A key to adults is provided for use with the chart, and the inadequate state of present knowledge of immature stages is briefly indicated.

Source and experimental methods of rearing a colony of *Aedes pseudoscutellaris* Theobald are described. Results are tabulated of a biometrical study of twenty-eight characters, in five series of *pseudoscutellaris* adults bred from larvae whose environment had been subjected to controlled variation of either temperature or salinity, and in one series of adults from different stock, also bred in controlled conditions. The records are analyzed and their implications discussed.

The results support the specific status accorded to members of the *scutellaris* subgroup, in that the observed range of experimental variation is not generally of the same magnitude as interspecific differences in the same character. Lack of variation in the basal lobe of the male coxite is evidence of its value in defining species. Two characters should probably be used with caution for delimiting species, since *pseudoscutellaris* can exhibit both extremes of their development. A complete interruption to the white bands on hind tarsal segments II–IV can be produced by low temperatures of larval environment. Presence or absence of a white streak under the proboscis may be due to differences in hereditary constitution, though larval environment also has some effect.

I. INTRODUCTION

IN recent years, many closely related mosquitoes which were, or would have been, regarded by earlier workers as varieties or subspecies, have been given full specific status. This is partly due to more adequate material being available for study, but in certain well-investigated groups, biological studies have suggested or proved the distinctness of the forms concerned, where morphological differences are slight or obscure. At the same time, cross-breding experiments have shown a few forms to be no more than subspecies. The classical example is the *Anopheles maculipennis* complex in Europe; others are the *Anopheles maculipennis* complex in North America and the *Anopheles gambiae* complex in Africa. Culicine mosquitoes have not received the same attention as Anophelines, but the *Culex pipiens* complex is now being widely studied.

All the foregoing groups of mosquitoes have a continental distribution. Where the members of a complex are geographic races, largely confined to different island groups, there might appear to be a strong case for regarding some, at least, of them as subspecies. Such a complex is the *Aedes scutellaris* subgroup, widely distributed in the Australasian region and the eastern part of the Oriental region. Of the eighteen described members of the subgroup, seventeen have been treated by recent authors as full species ; cross-breeding experiments have involved only four members, one of which, as a result, is regarded as a subspecies. There is a little evidence indicating biological differences between sympatric members of the subgroup, but no intensive research on the subject has been made. In many cases quite small morphological differences are used to separate the species.

Huxley (1942) described variation as "... a study of the differences between organisms. On analysis, these differences may turn out to be due to differences in environment ... or ... to differences in hereditary constitution ... or ... to a simultaneous difference both in environment and in constitution ... The important fact is that only experiment can decide between the two." Simpson (1944) pointed out that "... no morphological character is inherited as such. What is inherited is a complex of potentialities for development, and the ultimate morphological expression of the same hereditary characters may differ markedly."

It appeared that some light might be shed on the systematic status of members of the *scutellaris* subgroup by a study of the amount of variation that could be induced in one member by controlled variation of the environment. Comparison of specimens from different stocks of the same species, reared in identical conditions, might indicate differences due to hereditary constitution. At the same time, the reliability of certain taxonomic characters could be tested. In order to evaluate the results of the experimental work, it was first necessary to review the *scutellaris* subgroup as a whole, and to examine the characters in use for distinguishing the species.

In addition to laboratory-reared material, these studies are based on the examination of numerous specimens in the collections of the British Museum (Natural History), London School of Hygiene and Tropical Medicine, Bernice P. Bishop Museum, Honolulu (E. C. Zimmerman collection), and University of Queensland, and on notes on specimens in the U.S. National Museum made by Dr. Alan Stone.

II. REVIEW OF THE *SCUTELLARIS* SUBGROUP

(1) *General Survey*

The subgenus *Stegomyia* Theobald of genus *Aedes* Meigen is practically confined to the tropical and subtropical regions of the old world, chiefly the Ethiopian, Oriental and Australasian regions. *Aedes* (*Stegomyia*) *aegypti* Linn. has spread to the new world by man's agency.

A group of species within the subgenus *Stegomyia* is known as the *scutellaris* group. Its exact limits have been differently interpreted.

Edwards (1932) divided the subgenus *Stegomyia* into four groups. In what he termed " Group C (*scutellaris* group) " he included ten species from the Oriental and Australasian regions, Crete and Africa. Three of these were known from the Australasian region, *A.* (*S.*) *albolineatus* (Theobald), *A.* (*S.*) *albopictus* (Skuse) and *A.* (*S.*) *scutellaris* (Walker) (of which he listed five varieties).

The *albolineatus*-complex, removed from Group C by Knight & Rozeboom (1946), was named Group E (*albolineatus* group) by Knight & Hurlbut (1949). The latter authors divided Group C, thus modified, into three subgroups, viz.: Subgroup I, *scutellaris* s.str. Subgroup II, *albopictus*, and Subgroup III, *mediopunctatus*. The term " the *scutellaris* group " as used by Farner & Bohart (1945) and more recent authors has, in fact, referred to practically the same complex of species as Knight & Hurlbut's Subgroup I.[1]

The *scutellaris* subgroup of the present paper is synonymous with Knight & Hurlbut's Subgroup I, which the authors define as follows: " Characterized by having the more mesal portions of the abdominal tergal markings sub-basal. In addition, post-spiracular scales are lacking, the scutal longitudinal median line is relatively slender, and the pleural scale patches are arranged in two rather well-defined longitudinal bands (not true of *gurneyi*, however.)"

The following list of the species included by Knight & Hurlbut under their definition, with the addition of one species and one subspecies since described is arranged in chronological order of the date of publication of the names (as either varietal or specific). The original designation is given in parenthesis.

1. *scutellaris* Walker, 1859 (*Culex scutellaris*).
2. *pseudoscutellaris*[2] Theobald, 1910 (*Stegomyia pseudoscutellaris*).
3. *tongae* Edwards, 1926 (*Aedes variegatus* var. *tongae*).
4. *andrewsi* Edwards, 1926 (*Aedes variegatus* var. *andrewsi*).
5. *alorensis* Bonne-Wepster & Brug, 1932 (*Aedes* (*Stegomyia*) *variegatus* var. *alorensis*).
6. *horrescens* Edwards, 1935 (*Aedes* (*Stegomyia*) *scutellaris* var. *horrescens*).
7. *gurneyi* Stone & R. Bohart, 1944 (*Aedes* (*Stegomyia*) *gurneyi*).
8. *marshallensis* Stone & R. Bohart, 1944 (*Aedes* (*Stegomyia*) *marshallensis*).
9. *guamensis* Farner & R. Bohart, 1944 (*Aedes* (*Stegomyia*) *guamensis*).
10. *pernotatus* Farner & R. Bohart, 1944 (*Aedes* (*Stegomyia*) *pernotatus*).
11. *quasiscutellaris* Farner & R. Bohart, 1944 (*Aedes* (*Stegomyia*) *quasiscutellaris*).
12. *hensilli* Farner, 1945 (*Aedes* (*Stegomyia*) *hensilli*).
13. *paullusi* Stone & Farner, 1945 (*Aedes* (*Stegomyia*) *paullusi*).
14. *riversi* R. Bohart & Ingram, 1946 (*Aedes* (*Stegomyia*) *riversi*).
15. *scutoscriptus* R. Bohart & Ingram, 1946 (*Aedes* (*Stegomyia*) *scutoscriptus*).
16. *hakanssoni* Knight & Hurlbut, 1949 (*Aedes* (*Stegomyia*) *hakanssoni*).
17. *scutellaris katherinensis* Woodhill, 1949 (*Aedes scutellaris katherinensis*).
18. *polynesiensis* Marks, 1951 (*Aedes* (*Stegomyia*) *polynesiensis*).

---

[1] *A.* (*S.*) *gurneyi* is often placed with *albopictus*; *scutoscriptus* is also aberrant. Stone & Farner (1945) found *A.* (*S.*) *galloisi* Yamada difficult to place, from the description, and omitted it from their key; Knight & Hurlbut (1949) place it in Subgroup II, *albopictus*.

[2] Marks (1951) demonstrated that two species had previously been confused under the name " *pseudoscutellaris*." In this paper " *pseudoscutellaris* " is used for authors' references which do not discriminate between the two forms. Where the identity of the form is beyond doubt it is referred to under the appropriate name *pseudoscutellaris* or *polynesiensis*.

In addition there are three other forms known but not named.[1] The form of *A.* (*S.*) *scutellaris* described from Andaman Is. by Barraud (1928, 1934) is recognized by recent authors as probably distinct, and from my own observations of specimens I feel satisfied that this is so. Edwards (1929) noted a form from Rotuma I., north of Fiji, which differed in certain aspects from "*pseudoscutellaris.*" I have seen this also and it appears to represent a distinct race. Both these forms await review when more adequate material is available. Bohart & Ingram (1946*b*) gave some details of "*Aedes* sp. in *scutellaris* group" from Palau Group, Caroline Islands, and Dr. Alan Stone (*in litt.*) considers it is a valid species. He has sent me additional particulars of it which confirm his finding.

The *scutellaris* subgroup is equivalent to a "species group" of Zeuner (1943), or to a "superspecies" of Mayr (1942), if the latter concept were modified, as seems reasonable, to include groups of species which are mainly allopatric but in which the ranges of a few species overlap.[2]

Mattingly (1953) considers that *A.* (*S.*) *granti* (Theobald), which Knight & Hurlbut (1949) placed in Group C, Subgroup II—*albopictus*, belongs to the *scutellaris* subgroup, which it resembles in pleural markings. Mattingly uses the presence of an extra stripe of pale scales between the dorsal border of the sternopleuron and the lower edge of the posterior pronotum to link *granti* with *hakanssoni* and *scutoscriptus*, and to distinguish them from "more typical members of the group." However, a similar stripe may occur in *scutellaris*, in *pseudoscutellaris* and, reduced in length, in *polynesiensis*. It is most likely to be seen in large unrubbed specimens and might well be found in other species if suitable series were available. Descriptions indicate that *granti* differs from all the species here included in the *scutellaris* subgroup in markings of proboscis, female palps, wings, legs, scutellum and abdominal tergites (which have the white bands basal medially). While some species of the subgroup do not conform in certain characters with the general pattern, there is an overall strong indication of close relationship. In my opinion, inclusion of *granti* would destroy the homogeneity of the subgroup, which could no longer be regarded as representing a superspecies, whereas, if *granti* were placed by itself in a separate subgroup of Group C, the affinities with the *scutellaris* subgroup indicated by the pleural pattern would not be obscured.

The full synonymy of the various species of the *scutellaris* subgroup, first dealt with by Edwards (1917), has been fully covered in recent papers on the group (1944 onwards), and finally cleared up by the examination of a topotypic male of *Aedes scutellaris* (Walker). by Stone (1947). In references to earlier papers, species are treated here under the names by which they are at present recognized.

Table I records the treatment which species described before 1940 have received

---

[1] Since this paper went to press, Dr. R. M. Bohart has informed me of a fourth undescribed species from Korror I., in the Palau Group, and has very kindly supplied details which will enable it to be distinguished from others in the subgroup. Descriptions of the two species referred to here as Palau sp. and Korror sp. will be published by Dr. Bohart at an early date. In addition Mr. Mattingly informs me that he has recently examined a specimen of the *scutellaris* subgroup from the Maldive Is., a description of which is in the press. In the majority of characters, including the basal lobe of the male coxite, it closely resembles *scutellaris scutellaris* but it differs in having white scales on the under side of the proboscis.

[2] The concept has recently been so modified (Mayr et al., 1953, p. 29).

TABLE I.—*Synopsis of Taxonomic Status Accorded Members of the* scutellaris *Subgroup described before 1940*

Species and synonyms	Theobald (1901)	Edwards (1917)	Edwards (1924)	Edwards (1926)	Bonne-Wepster and Brug (1932)	Edwards (1932)
Scutellaris	*Stegomyia scutellaris*	*Stegomyia variegata*	*Aedes (Stegomyia) variegatus*	*A.* (*S.*) *variegatus*	*A.* (*S.*) *variegatus*	*A.* (*S.*) *scutellaris*
Culex variegatus Doleschall (*nec* Schrank), 1858						
Culex zonatipes Walker, 1861	Syn. of *Stegomyia fasciata* (Fabr.) (= *A.* (*S.*) *aegypti* Linn.)					
Aedes variegatus var. *hebrideus* Edwards, 1926				*A.* (*S.*) *variegatus* var. *hebrideus*	*A.* (*S.*) *variegatus* var. *hebrideus*	*A.* (*S.*) *scutellaris* var. *hebrideus*
Pseudoscutellaris	(1910) *Stegomyia pseudoscutellaris*			*A.* (*S.*) *variegatus* var. *pseudoscutellaris*	*A.* (*S.*) *variegatus* var. *pseudoscutellaris*	*A.* (*S.*) *scutellaris* var. *pseudoscutellaris*
Tongae	—	—	—	*A.* (*S.*) *variegatus* var. *tongae*	*A.* (*S.*) *variegatus* var. *tongae*	*A.* (*S*) *scutellaris* var. *tongae*
Andrewsi	—	—	—	*A.* (*S.*) *variegatus* var. *andrewsi*	*A.* (*S.*) *variegatus* var. *andrewsi*	*A.* (*S.*) *scutellaris* var. *andrewsi*
Alorensis	—	—	—	—	*A.* (*S.*) *variegatus* var. *alorensis*	—
Horrescens	—	—	—	—	—	—
					Varieties	

Species and synonyms	Barraud (1934)	Edwards (1935)	Knight, Bohart & Bohart (1944)	Farner & Bohart (1945)	Stone & Farner (1945)	Bohart & Ingram (1946)	Stone (1947)
Scutellaris . . *Culex variegatus* Doleschall (*nec* Schrank), 1858 *Culex zonatipes* Walker, 1861 .	*A.* (*S.*) *scutellaris*	—	*A.* (*S.*) *scutellaris scutellaris*	—	*A.* (*S.*) *scutellaris*	—	*A.* (*S.*) *scutellaris*
Aedes variegatus var. *hebrideus* Edwards, 1926 .	*A.* (*S.*) *scutellaris* var. *hebrideus*	—	*A.* (*S.*) *scutellaris hebrideus*	*A.* (*S.*) *hebrideus*	*A.* (*S.*) *hebrideus*	*A.* (*S.*) *zonatipes*	
Pseudoscutellaris .	*A.* (*S.*) *scutellaris* var. *pseudoscutellaris*	—	*A.* (*S.*) *scutellaris pseudoscutellaris*	*A.* (*S.*) *pseudoscutellaris*	*A.* (*S.*) *pseudoscutellaris*	*A.* (*S.*) *pseudoscutellaris*	
Tongae . . .	*A.* (*S.*) *scutellaris* var. *tongae*	—	*A.* (*S.*) *scutellaris tongae*	*A.* (*S.*) *tongae*	*A.* (*S.*) *tongae*	—	—
Andrewsi . .	*A.* (*S.*) *scutellaris* var. *andrewsi*	—	—	—	*A.* (*S.*) *andrewsi*	—	—
Alorensis . .	*A.* (*S.*) *scutellaris* var. *alorensis*	—	—	—	*A.* (*S.*) *alorensis*	—	—
Horrescens . .	—	*A.* (*S.*) *scutellaris* var. *horrescens*	*A.* (*S.*) *scutellaris horrescens*	*A.* (*S.*) *horrescens*	*A.* (*S.*) *horrescens*	—	—
	Varieties		Subspecies	Species			

from those authors responsible for changes in nomenclature or systematic status. Forms described since 1940 have suffered no change in the status ascribed to them by their original authors.

The first recognition of the *scutellaris* subgroup as such (i.e., that *A. scutellaris* as then recognized comprised a complex of closely related forms was by Edwards (1926), prompted by Buxton & Hopkins who had observed constant differences between the anal gills of larvae from Samoa and from the New Hebrides. He found that " there are at least five distinct varieties distinguishable by small differences of colour and also by the male hypopygium, especially in the form of the basal lobe of the sidepiece. The characters are fairly well defined, but are perhaps best treated as varietal rather than specific, especially as their significance appears to be mainly geographical."

Barraud (1928), Edwards (1929) and Bonne-Wepster & Brug (1932) gave details of forms from Andaman Is., Rotuma I. and Taroena (= *paullusi*) respectively which differed from those already described but did not give them varietal names ; the last authors, however, described a sixth variety, *alorensis*.

Following Edwards, varietal status was ascribed to the named forms until Knight, Bohart & Bohart (1944) listed them as subspecies, without comment on the change.

Farner & Bohart (1945) on the basis of male genitalia differences, regarded the known Australasian members of the *scutellaris* subgroup as separate and distinct species occupying similar ecologic niches. The occurrence of more than one from the same area lent support to their contention.

Farner (1945) observed, in describing *hensilli*, that it was possibly a subspecies of *guamensis* but until further material was available and in view of the differences in tarsal and abdominal banding it seemed best to regard it as specifically distinct from *guamensis*.

Since 1944, most authors have described new forms as full species without comment on their status. The exception is *scutellaris katherinensis* to which Woodhill (1949*a*) gave subspecific rank on the grounds of its ability to hybridize with *scutellaris scutellaris*.

The description in recent years of many new forms in the *scutellaris* subgroup reflects an increase in the quantity and quality of collections, and the examination of males from localities whence only females were known before. Additional characters have been brought into use for identifying the different species but it cannot be said that the recognition of the various forms as full species is due to the discovery of new and more significant characters. They are still distinguished from one another chiefly by differences previously in use for separating those forms recognized as varieties. It is the significance placed on these characters by taxonomists that has altered.

The treatment of the different forms (except *s. katherinensis*) as full species is now general, and will probably remain so unless it can be proved incorrect. Not all culicidologists are convinced that this treatment is in all cases justified, and where forms replace one another geographically it may yet be possible to demonstrate that some are, in fact, only subspecies. Morphological differences between some species appear to be no greater than those between the subspecies *s. scutellaris* and *s. katherinensis*. However, to quote Mayr (1942), "Considerably more material must be examined in order to recognize subspecies, than is needed for the description of good species."

It may be, on the other hand, that, with further knowledge of geographical variation, what is now recognized as a single monotypic species will be broken up into two or more subspecies. Bohart & Ingram (1946*b*), for instance, found that specimens of *hensilli* from Ulithi had the last tarsal segment usually about half white, whereas in Truk specimens it varied from two-thirds white to all white; there was also a greater tendency for complete abdominal bands in Truk females. There may be some slight differences between *tongae* from Tonga and from Sikiana in degree of development of specialized setae on the basal lobe of the male coxite.

I have seen a series of eight specimens of *s. scutellaris* from Admiralty Is., two of which are normal, four have a line of white scales on the anterolateral margin of the scutum, one has hind tarsal V with a dark patch at the tip, and one has hind tarsal bands reduced in width and segment V dark on the apical half. A male similar to the last and a normal male were reared from the same larval collection from Aneityum I., New Hebrides, by Dr. Marshall Laird. Male genitalia of the three types appear identical. These variations have not been recorded from elsewhere in the range of *s. scutellaris*. Male genitalia of the three types appear identical.

The few hybridization experiments recorded, viz.: *s. scutellaris* × *s. katherinensis* (Woodhill, 1949*a*), *s. scutellaris* and *s. katherinensis* × *pseudoscutellaris* [1] (Woodhill, 1950), and *s. scutellaris* × *pernotatus* (Perry, 1950), have only served to confirm the status already ascribed to the forms concerned.[2] Smith-White (1950) discussed the genetical significance of non-reciprocal fertility between *s. scutellaris* and *s. katherinensis* and suggested further lines of investigation.

(2) *Taxonomic Characters*

(*a*) General

Doleschall (1858) and Walker (1859, 1861) made no comparison with other species in their descriptions, which all apply to *s. scutellaris*.

Theobald (1901, 1903, 1907, 1910*a*) included specimens of both *albopictus* and members of the *scutellaris* subgroup in his concept of *scutellaris*. When (1910*b*) he described *pseudoscutellaris* he distinguished it by the characters in which it differs from what he called "*scutellaris*", but we now know to have been *albopictus*, i.e., by the typical *scutellaris* subgroup pleural markings of white lines. He also observed the curving white lateral patches on the abdominal tergites. Edwards (1917) included several forms of the *scutellaris* subgroup, among them *pseudoscutellaris*, in one monotypic species and it was not until 1926 that he realized they represented a complex of distinct forms.

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[1] I have confirmed by examination of specimens the identity of Woodhill's colony as *pseudoscutellaris* and not *polynesiensis*.

[2] Woodhill (1954) has crossed *pseudoscutellaris* from Fiji with *polynesiensis* from Tahiti and obtained small numbers of fertile hybrids, showing that the two species are not genetically isolated, though they do not mate readily in laboratory conditions. This suggests that *polynesiensis* may be a subspecies of *pseudoscutellaris*. However, repetition of the experiment using Fijian *polynesiensis* and a study of the habits of the two forms, where they occur together in nature, would appear desirable in order to judge whether there are barriers to their natural hybridization.

The characters discussed here include all that have been found of importance by Edwards and later authors in identification of specimens of the *scutellaris* subgroup and some which have been suggested but are not in general use. A consideration of their occurrence and variability supplements the information given in Plate 1. They do not, however, include all characters which may be noted in descriptions. The first author to use a character is indicated. A name is put in inverted commas where it is obvious that an author was including more than one form under it.

Colour differences have been noted in some cases. Not enough is known about factors causing differences in scale colour, but generally in mosquito taxonomy, such small differences as between white and creamy white or yellowish are of doubtful value.

(*b*) Head

Bonne-Wepster & Brug (1932) noted in the median white stripe on the vertex, a difference in the width towards the nape between " *scutellaris* " and *alorensis* ; this character is not in general use.

The same authors observed that Taroena specimens of " *scutellaris* " (= *paullusi*) had a distinct white line under the proboscis ; this feature is now known to occur in a number of species, sometimes in the male only ; in some cases it appears to be very variable.

Stone & Farner (1945) noted the white stripe in *paullusi* males, but only a few pale scales under the female proboscis ; I have seen a male of this species from Samar I. which lacks the white stripe. The following species have a white stripe : *riversi* ♂, ♀ ; *quasiscutellaris* ♂, ♀ ; *tongae* ♂, ♀ (Stone & Farner (1945) observed this in ♂, it is also present in all ♀♀ I have seen) ; *horrescens* ♂ (♀ with some pale scales) ; *pernotatus* ♂, ♀ (but I have seen *pernotatus* ♂♂ in which it was lacking). It is present also but has not previously been noted in Andamans sp. ♂, ♀, and *alorensis* ♂ ; and I have observed that there may be some pale scales under the proboscis in *andrewsi* ♂, *scutoscriptus* ♂ (Dr. Alan Stone informs me (*in litt.*) that *scutoscriptus* has a faint line of yellowish brown scales on the underside of the proboscis) and Rotuma sp. ♂. Bohart & Ingram (1946*b*) noted that the proboscis of " *pseudoscutellaris* " ♂♂ sometimes has some pale scales beneath ; this was also observed by Marks (1951*a*) in " *pseudoscutellaris* " (= *polynesiensis*) ♂♂ and ♀♀. Both sexes of *pseudoscutellaris* may have proboscis with a white stripe beneath, or entirely dark ; variation in this is shown in Table V.

Stone & Bohart (1944) found that *marshallensis* had the white markings on the male and female palps considerably reduced ; this is the only species thus distinguished.

(*c*) Thorax

Scutum. Edwards (1926) noted that the scales of the median stripe might be creamy rather than white. Bonne-Wepster & Brug observed that the stripe in *alorensis* was narrower than in " *scutellaris*," and Edwards (1935) that in *horrescens* it was broader than in " *pseudoscutellaris* " but no measurements have been made from comparable series of different species. Environmental conditions can affect this character in *pseudoscutellaris*.[1] The median line often continues into a denfiite or faint fork on either side of the prescutellar bare area: Bonne-Wepster & Brug (1932) noted some whitish scales in this position in "*scutellaris*," a distinct fork occurs in *hakanssoni* and *scutoscriptus*, and I have observed it also in Andaman Is., form and in *alorensis*; Woodhill (1949*a*) found no fork in the great majority of specimens of *s. katherinensis*; most authors refer to it only in general terms. Variation of the amount of white scaling in this position in *pseudoscutellaris* is shown in Table VII. It may be a character of which more use could be made.

Bonne-Wepster & Brug (1932) observed a narrow white line on the anterolateral margin of the scutum in Taroena specimens of "*scutellaris*" (= *paullusi*); Stone & Farner (1945) observed a similar line of fine yellowish scales in *quasiscutellaris* (not noted in the original description); *scutoscriptus* has a broad line in this position; a narrow line occurs in *hakanssoni*, *pseudoscutellaris*, and in some specimens of *s. scutellaris* from Admiralty Is. In all except probably *scutoscriptus* these lines are variable and may be incomplete, particularly in females. In *pseudoscutellaris* they may be reduced to patches of scales on the scutal angles. Species which usually have the scutal angle dark scaled may sometimes have two or three pale scales in this position though this has not been recorded in descriptions. I have observed this in *polynesiensis*, *andrewsi*, *alorensis*, *guamensis*, *horrescens* and Rotuma sp. The number of pale scales on the scutal angle is important in distinguishing between specimens of *pseudoscutellaris* and *polynesiensis* and would possibly prove of use in other cases if details were available.

The white scales above the wing root are usually all broad. In *hakanssoni* this is not specifically stated in the description and, in fact, I have observed that they are mainly narrow-curved. In *scutoscriptus* there are some narrow-curved scales in addition to the broad ones noted in the description. It is possible that they have been overlooked in other species also, and it is a character that is worth further investigation.

Scutellum.

The characteristic scaling of the scutellum in the *scutellaris* subgroup is white, with a small patch of black scales at the apex of the midlobe. Knight & Hurlbut (1949) found that *hakanssoni* has much more extensive black scaling. *Gurneyi* is described on differences from *albopictus* and by inference has all lobes entirely white scaled, but Dr. Stone informs me (*in litt.*) that there are a few dark scales at the tip of the midlobe in unrubbed specimens.

Pleuron.

Stone & Bohart (1944) observed that the white scales on the pleura of *gurneyi* are arranged in patches rather than the straight lines characteristic of other members of the *scutellaris* subgroup (in this it resembles *albopictus*). The description of *scutoscriptus* indicates that only the upper pleural line is complete in this species.

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[1] Mr. P. F. Mattingly drew my attention to a character which Edwards found useful in separating African species of *Stegomyia*, viz., the presence of broad scales medially on the anterior margin of the scutum. A cursory examination of the experimental series of *pseudoscutellaris* showed that these scales might be present or absent and suggested that they are affected by environment though this was not thoroughly investigated. The character therefore does not appear a promising one for use in the *scutellaris* subgroup.

Specimens of some species have the upper and lower white patches on the mesepimeron fused, in others they are separate ; usually no note of this is given. I have observed both conditions in *pseudoscutellaris* and it does not appear a promising diagnostic character, though it would need further investigation to be certain.

Wings. These are dark scaled in all species. Wing length is often given as a measure of size but not as a diagnostic character. In some species a white spot occurs at the base of the costa ; it has possibly been overlooked in others ; it is a practically constant character in *pseudoscutellaris*. The ratio of the length of the fork cells to their stems, a character used in several culicine groups, is omitted from most descriptions.

Halteres. The scaling of the halteres is not recorded for all species, but in most the knob appears to be mainly dark scaled, whereas in *scutoscriptus* Farner & Bohart (1946) observed it to be entirely pale scaled and in *hakanssoni* it is largely pale.

(*d*) Legs

Fore femur. Stone & Bohart (1944) noted the absence of a white apical spot on the fore femur of *marshallensis* but it apparently occurs in all other species.

Mid femur. Bonne-Wepster & Brug (1937), who had a mixed collection of "*scutellaris*," observed that sometimes the mid femur had a thin longitudinal white stripe on the outer (= anterior) side. Stone & Farner (1945) noted this as one of the diagnostic characters of *paullusi* ; Woodhill (1949*a*) found that it was a constant character by which *s. katherinensis* could be distinguished from *s. scutellaris*. I have found that a similar white stripe occurs in *alorensis* ; this had previously been overlooked. Of five adults of *andrewsi* examined, one female had an anterior line on the basal two-thirds of one femur ; possibly this was an aberrant specimen, or else in this species the character may be variable.

Fore and mid tibiae in some species have scattered pale scales posteriorly, but this has not been used as a diagnostic character.

Fore and mid tarsi. Most species have white patches at the base of segments I and II on fore and mid tarsi. Edwards (1935) noted that *horrescens* had white scales more frequently on fore and mid tarsal III than did "*pseudoscutellaris*" ; Farner & Bohart (1944) found that males of *guamensis* had the fore tarsus entirely dark and distinguished *pernotatus* by the presence of basal patches on III and sometimes IV and V ; *quasiscutellaris* is similar to *horrescens*. I have observed that in *andrewsi* only fore and mid tarsal segment I has a basal white patch. The development of this character in *pseudoscutellaris* is shown in Table VIII.

Hind femur. Edwards (1926) noted differences in the size of the white spot at the tip of the hind femur, but this is not a useful character. Bohart & Ingram (1946*b*) drew attention to two distinct types of pattern in the marking of the anterior surface of the hind femur ; there is a longitudinal pale area which either forms a tapered white line (in most species), or trails off ventrally towards the tip rather than tapering to a sharp point (in *guamensis*,[1] *scutoscriptus*, *hakanssoni* and sp. from Palau, also in some specimens of *marshallensis* (see p. 382)).

I have observed an apparent difference between *pseudoscutellaris* and *polynesiensis* in the distance from the base of the femur to the beginning of the dark ventral scaling, but the character needs further investigation.

Hind tarsi. The white bands on the hind tarsi are one of the most important distinctive characters, and are usually measured in terms of the ratio of the length of the band to the total length of the segments ; most species have V entirely white. Edwards (1926) observed differences in the widths of the bands and gave ratios for segment IV. Bonne-Wepster & Brug (1932) observed that in " *scutellaris* " the band on I was incomplete (i.e., interrupted by dark scales beneath) and gave ratios for the bands on II–IV, noting that Taroena specimens (= *paullusi*) had wider bands on IV. Stone & Bohart (1944) found *marshallensis* had V dark on the apical half or more ; *hakanssoni* is similar ; in *hensilli* the character shows geographical variation, Ulithi specimens have the apical half dark, whereas in Truk specimens not more than one-third is dark and the segment may be all white. Two specimens of *s. scutellaris* (one from Admiralty Is. ; one from Aneityum I., New Hebrides) have been seen with apical half of V dark and bands on other segments reduced.

Farner & Bohart (1944) observed that *guamensis* had the white bands completely interrupted by dark scales on the inner side. Stone & Farner (1945) noted that *andrewsi*[2] had the bands on IV interrupted on the dorsal surface, but this appears to be variable and I have seen two females with the band quite complete. The majority of species have the band on I interrupted beneath though it is recorded as complete in a few and not noted in others. It was complete in specimens of *alorensis* and Andamans sp. examined. In some species the extent to which the remaining bands are interrupted has been found to be quite variable. *Tongae* was previously recorded as having complete bands on II–IV, but I have seen one specimen from Tonga with I–V, another with IV and V, and one from Sikiana with IV completely interrupted. Complete bands are also recorded for *pernotatus* but a specimen from Aneityum I., New Hebrides, has the bands on I–IV completely interrupted beneath. Variation in this character in *pseudoscutellaris* is shown in Tables XIII–XVIII. Farner (1945) gave measurements of the inner as well as the outer lengths of the white bands in *hensilli*. Stone & Farner (1945) reversed the usual convention by giving the width of the dark band on segment IV at its widest dimension, but no other authors have followed this formula.

(*e*) Abdomen

The characteristic markings of the abdominal tergites in the *scutellaris* subgroup are lunate lateral white patches curving away from the base of the segment into forwardly directed hooks which may extend dorsally to form a broken or complete sub-basal band across the segment. The characteristic markings of a species usually show best on tergites IV–VII but may be found on II and III in some.

[1] Not noted in the original description.

[2] Stone & Farner said they had not examined specimens of *andrewsi* and it was included in their key on the basis of the original description ; however, the latter does not mention this character.

Edwards (1926) observed the degree of completeness of these bands on the different segments of the abdomen; this continues to be one of the principal diagnostic characters employed, but in some species is rather variable. He noted the distance the bands were removed from the bases of the tergites; Bonne-Wepster & Brug (1932) also used this character, and Knight & Hull (1952) found differences in it between *paullusi* and *s. scutellaris*. It is possible that if long series of other species were examined and the measurement could be made from the actual base of the tergite, and not from the apex of the preceding one, distinctive differences might be found. In practice, with dried specimens which have been in various conditions and ages when killed and have shrunk to different extents, the character has not been proved a generally useful one, the more so as not all authors have noted it when describing species. Edwards (1926) also noted whether the lateral patches were creamy or white and (1935) on what segments they were visible dorsally; the latter character is rather unreliable. Farner & Bohart (1944) observed sub-basal lateral patches on *guamensis* which are not of the typical lunate shape, but rather triangular. There is possibly some variation in the shape of the lateral patches in other species, but no long enough series have been examined to be sure of this.

Edwards (1926) recorded the scale pattern of the sternites, whether those of the basal segments were all white, or had apical black bands; the latter is the more common condition. This is not one of the principal diagnostic characters but might be used to supplement them in some cases. It may prove rather variable and in dried specimens the sternites are often difficult to see. Some ♀♀ of *s. katherinensis* which have narrow sub-basal white bands on sternites V and VI and a submedial band on VII appear distinct from *s. scutellaris* which usually has wide basal bands on V and VI, and often only small lateral patches on VII; other specimens are much more like *s. scutellaris*.

(*f*) Male genitalia

Edwards (1926) first recognized that members of the *scutellaris* subgroup ("races of *Aedes variegatus*") could be distinguished "by the male hypopygium, especially in the form of the basal lobe[1] of the sidepiece." The parts that have been used in distinguishing members of the *scutellaris* subgroup include the ninth tergite, coxite, style and basal lobe of coxite. The complete genitalia of *pseudoscutellaris* are illustrated in Fig. 1. There are various terminologies in use for the description of the parts of the male genitalia. That followed here is given by Edwards (1941), and all except direct quotations from other authors have been translated to these terms. The male genitalia of the mosquito rotate 180° during the first 24 hours

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[1] The term basal lobe is in general use for this structure in subgenus *Stegomyia*; it bears no resemblance to, for instance, the basal lobe in subgenus *Ochlerotatus*. In the *scutellaris* subgroup, its anatomical position indicates that it is homologous with the harpago (claspette of Edwards) of *Ochlerotatus* and *Finlaya*, though it lacks the terminal appendage present in those subgenera. Edwards (1941) in his general description of mosquito genitalia describes the basal lobe as a modification of the coxite on the area between the ventral root and the midsternal connection of the coxites. "In some genera part or the whole of this basal lobe has more the form of a subsidiary appendage, which has been called the claspette." In his description of subgenus *Stegomyia* he says "claspettes in the form of a hairy basal lobe or plaque attached to sternal side of coxite, this plaque in a few species with the inner part forming a small process bearing modified bristles." This is in contrast to his earlier (1932) description of the subgenus "... basal lobe (plaque) present and hairy; no claspettes."

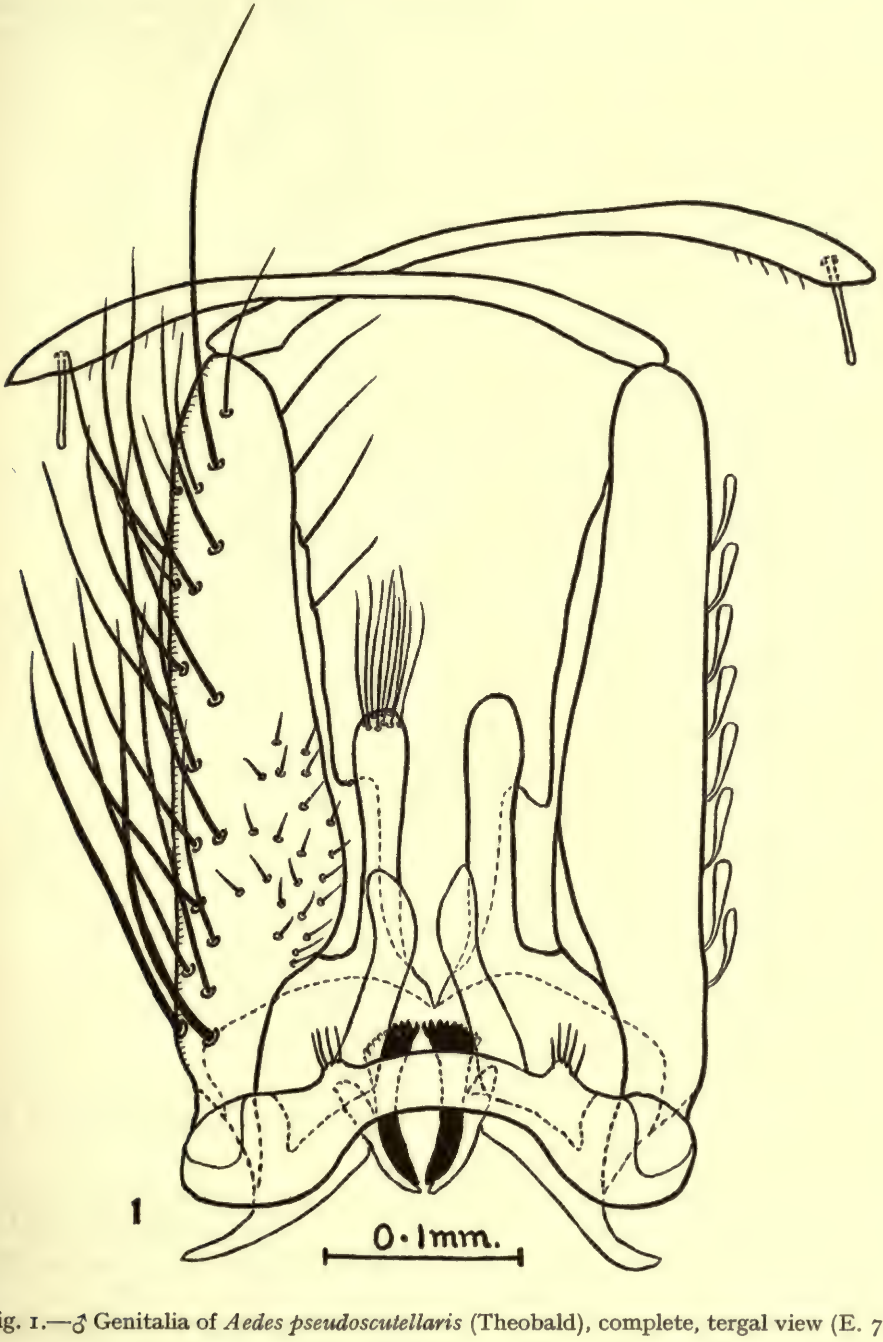


Fig. 1.—♂ Genitalia of *Aedes pseudoscutellaris* (Theobald), complete, tergal view (E. 7).

after emergence. Thus the 8th and 9th tergites become ventral, the 8th and 9th sternites dorsal. The ventral aspect referred to in the literature is therefore tergal. The left coxite, of which the basal lobe is usually illustrated, is that on the left side of the insect after rotation and therefore on the left side of figures of whole mounts of genitalia which are conventionally drawn from the tergal aspect with the distal portions towards the top of the page. In this paper the view from the mid line of the genitalia is referred to as " inner lateral view " (illustrated in Fig. 2), and that of the side of the basal lobe nearest the coxite as " outer lateral view."

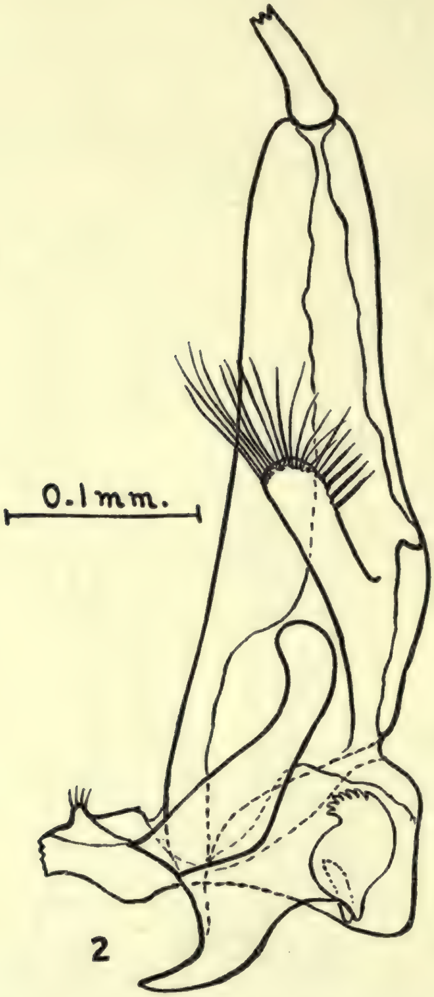
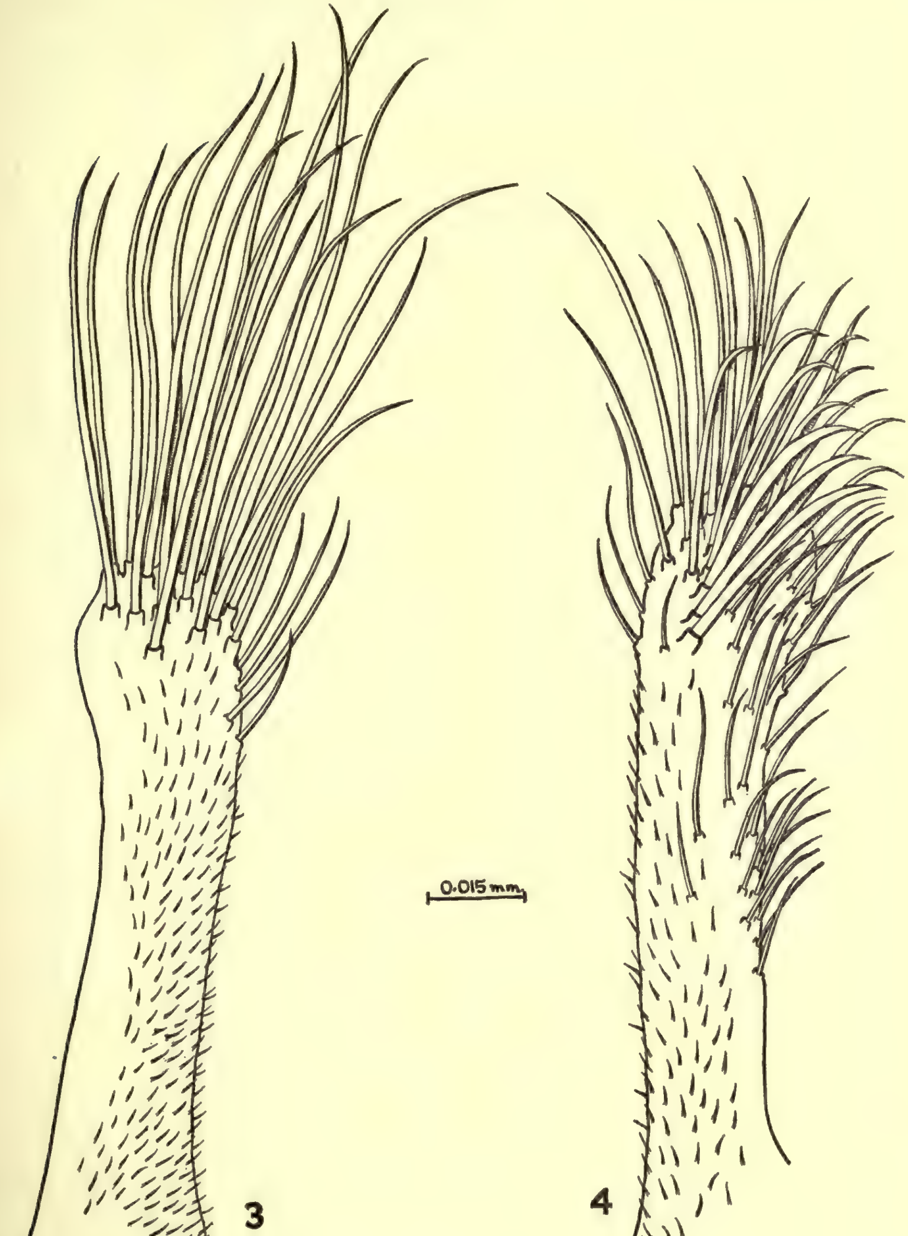


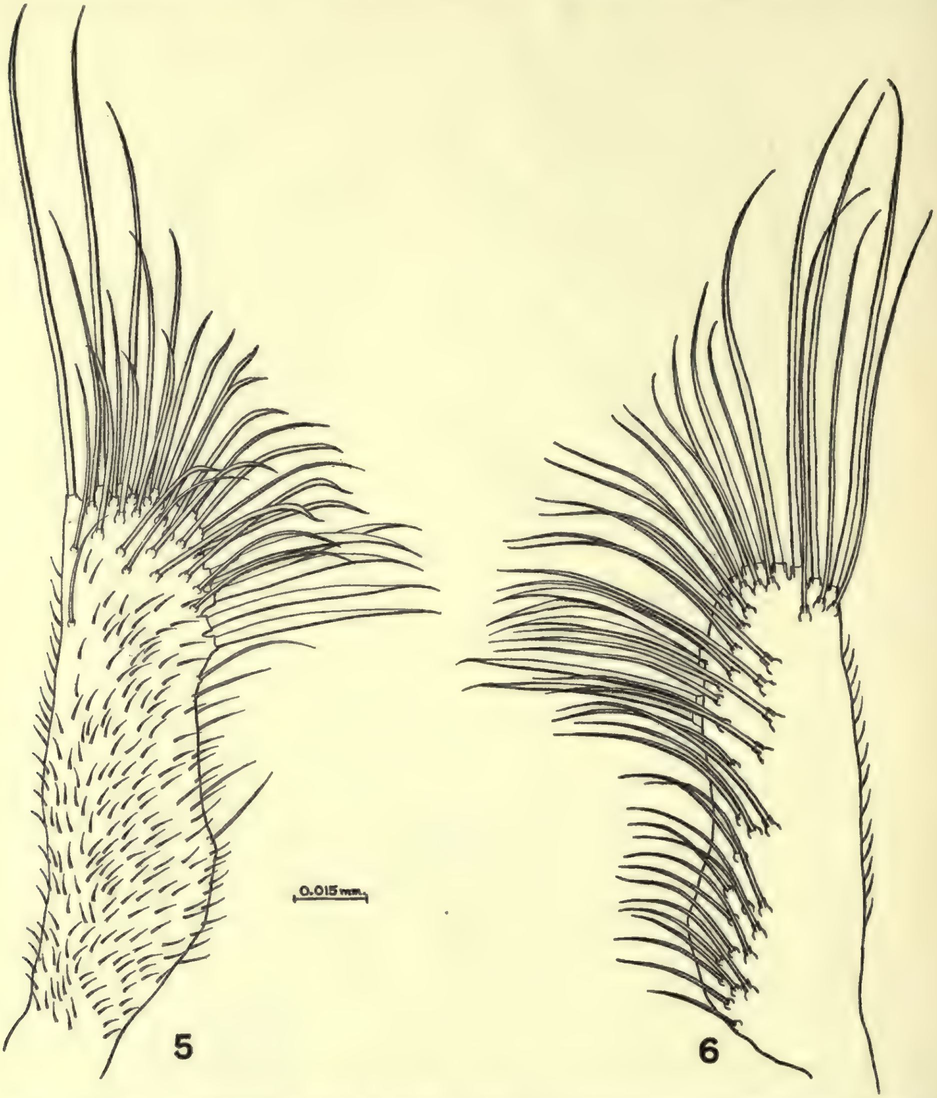
Fig. 2. ♂ genitalia of *Aedes pseudoscutellaris* (Theobald) bisected, inner lateral view (H. 33).

Certain of the setae of the basal lobe may be enlarged, thickened or flattened and arise from tubercles ; these are quite distinct in appearance from the remainder



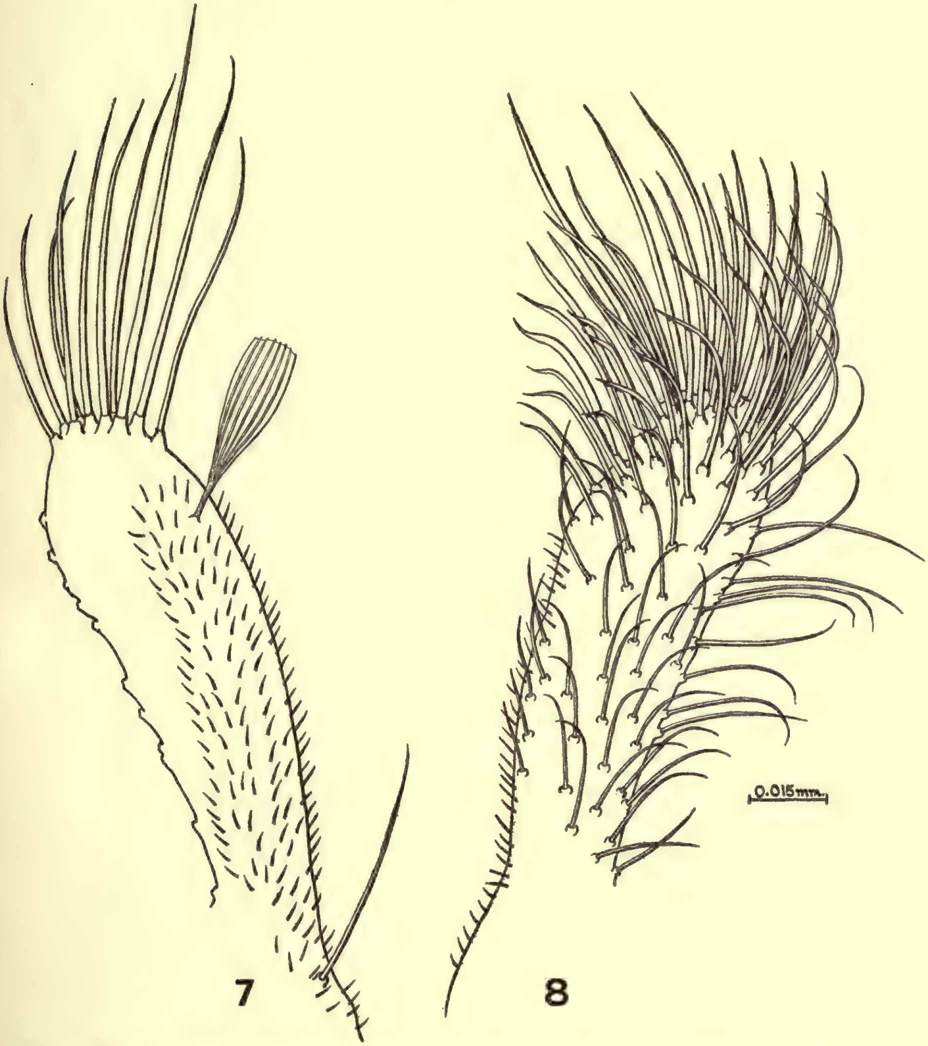
FIGS. 3 and 4. Left basal lobe of ♂ coxite of *Aedes pseudoscutellaris* (Theobald). Fig. 3. Tergal view (B .7). Fig. 4. Sternal view (B. 7).

and are here referred to as specialized setae. Other authors have given them various designations (not always very clearly defined, but usually interpretable by reference to accompanying figures). The term does not include the very long hairs at the tip of the lobe in some species which are thickened and elongated by reason of their size but do not differ in form from the majority—these are the "thickened bristles" of some authors. In several species a scale has occasionally been observed on the basal lobe (Fig. 7); it appears to be an aberration of no taxonomic significance.



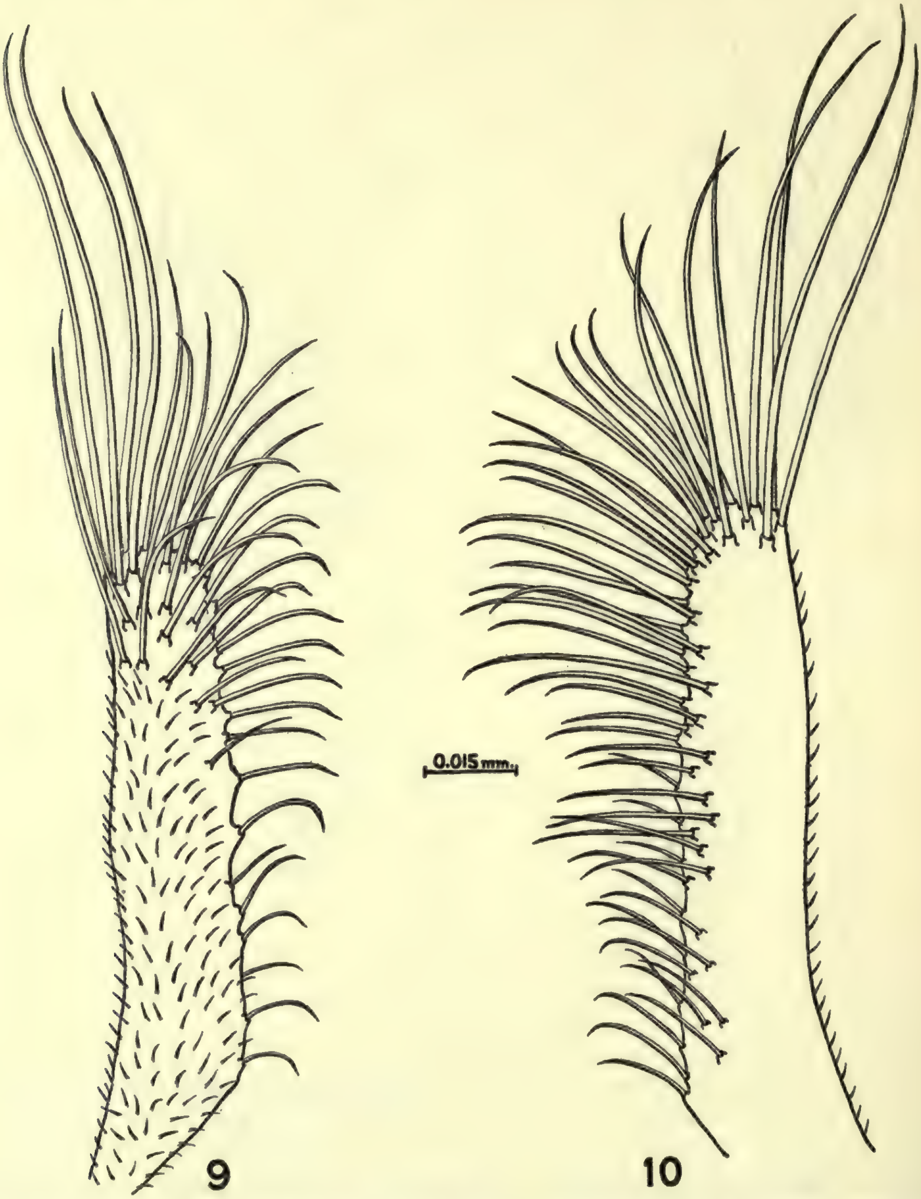
FIGS. 5 and 6. Left basal lobe of ♂ coxite of *Aedes pseudoscutellaris* (Theobald). Fig. 5. Inner lateral view (B. 1). Fig. 6. Outer lateral view (B. 1).

Edwards (1926) found differences in the length of the coxite compared with its breadth at the base; this ratio has not been recorded for most of the recently described species. Though the character by itself is not diagnostic it might be advantageous to have some note of it as it would give a basis of comparison where, as in many cases, the only part of the genitalia illustrated is the basal lobe.



FIGS. 7 and 8. Left basal lobe of ♂ coxite of *Aedes polynesiensis* Marks. Fig. 7. Tergal view (the scale is aberrant). Fig. 8. Sternal view. ♂, Taveuni, Fiji.

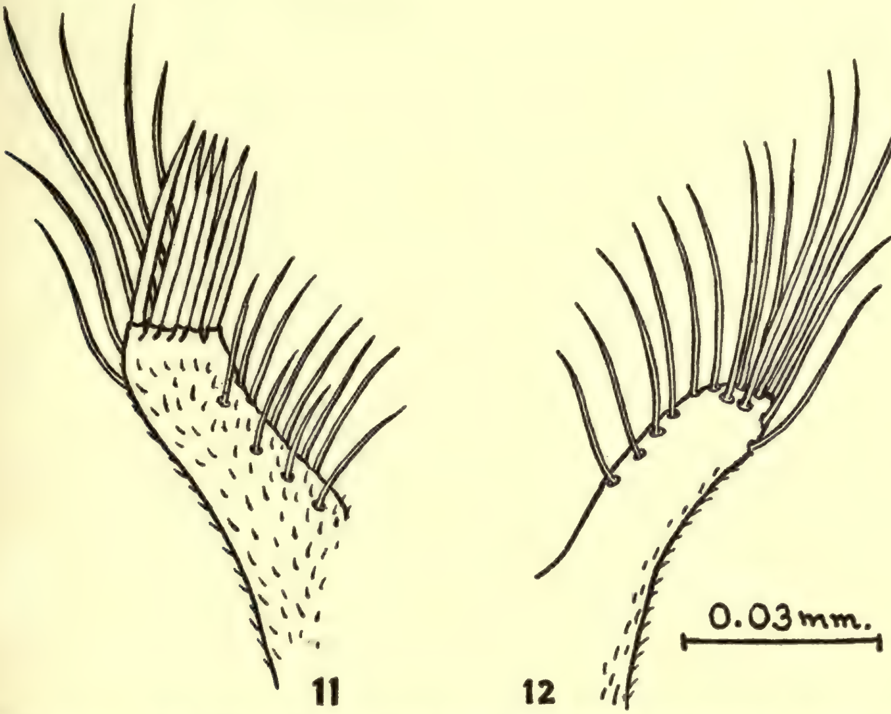
Edwards also observed differences in the style, whether slender or moderately stout, with tip swollen to varying degrees, and with its spine slender or stout, blunt or pointed. Such differences of degree are not very useful diagnostic characters, in particular if other forms are not available for comparison. The appearance of the style depends to some extent on the way the specimen has been mounted. If the ratio of length of style to length of coxite were recorded, differences might be found between species. The spine varies even more with the mounting, as it is



FIGS. 9 and 10. Left basal lobe ♂ coxite of *Aedes polynesiensis* Marks. Fig. 9. Inner lateral view. Fig. 10. Outer lateral view. ♂, Suva, Fiji.

liable to shrink in diameter, and I have seen it appear quite different in two specimens of the one species.

Another character used by Edwards (1926) was the form of the ninth tergite—whether convex or emarginate—it is emarginate in *quasiscutellaris*, convex in most other species in which it has been described. The sclerotized portion of the tergite is narrow and very apt to become twisted in a mounted preparation, so that its shape is not always easy to interpret.

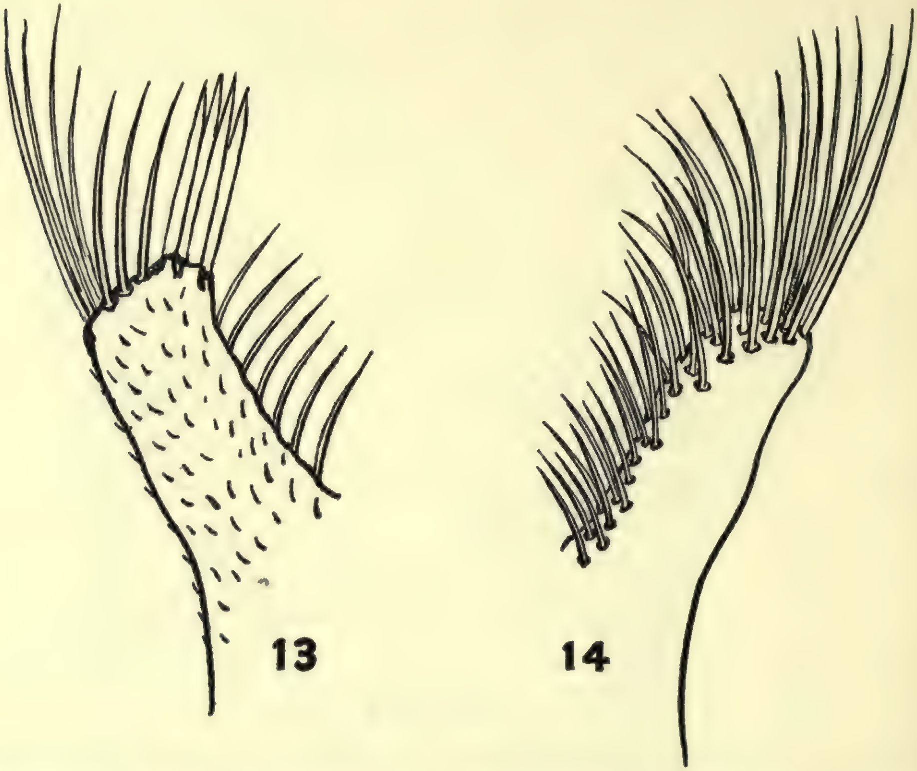


FIGS. 11, 12. Left basal lobe of ♂ coxite of sp. in *scutellaris* group from Andaman Is. Fig. 11. Inner lateral view. Fig. 12. Outer lateral view.

The character which Edwards observed as most important, the basal lobe, is now often the only part of the genitalia described or figured, since it has been found the most distinctive of all diagnostic characters used in separating the species of the *scutellaris* subgroup.

Edwards noted that the basal lobe differed in shape, the tip rounded, square-ended or conical; also in the length and disposition of the setae at the tip. He did not mention the occurrence on the basal lobe in any forms of stouter specialized setae, though his figure of *andrewsi* suggests they were observed in this species. The figures suggest (as do Edwards' preparation of genitalia of British Museum specimens) that the genitalia were mounted undissected; they were drawn in tergal view. He distinguished the basal lobe of *tongae* from that of "*pseudoscutellaris*" by the fact that the former was hairy at the tip only and the latter hairy on the apical half or more. Edwards' figure shows the setae extending half-way down the tergal aspect of the basal lobe of "*pseudoscutellaris,*" though in fact they occur on the sternal aspect. The specimen figured was from Samoa (= *polynesiensis*).

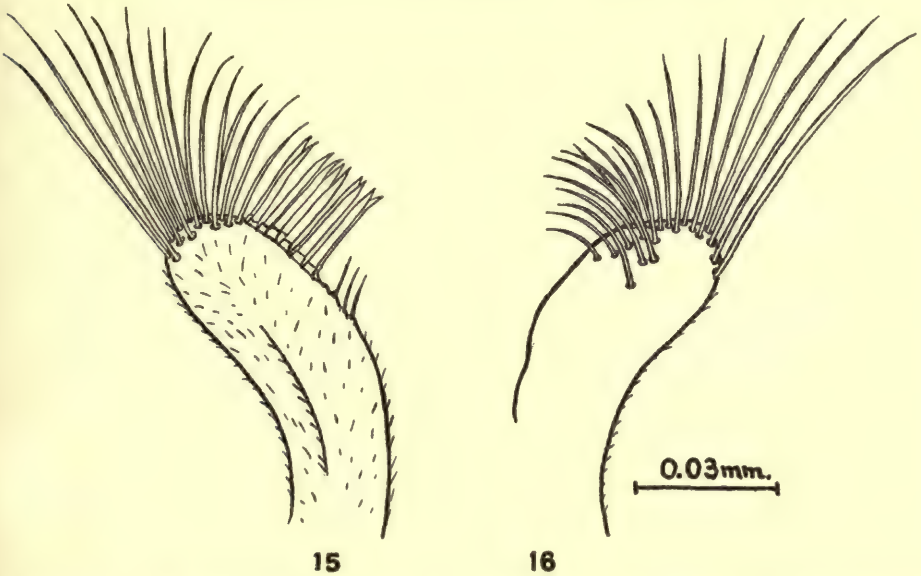
Barraud (1928) was the first to record the presence of specialized setae on the basal lobe. He observed in Andaman Is. form that a few of the setae at the apex of the basal lobe are "stouter and more blade-like than the majority." Bonne-Wepster & Brug (1932) recognized the distinctive form of the basal lobe in *alorensis* and the presence of "a peculiar claspette-like, long and slender structure with two filaments at tip." (In my opinion really part of the basal lobe bearing specialized setae (see figure in Plate 18).



FIGS. 13, 14. Left basal lobe of ♂ coxite of *Aedes andrewsi* Edwards from Christmas I. Fig. 13. Inner lateral view. Fig. 14. Outer lateral view.

Farner & Bohart (1944) described and figured "enlarged bristles" (i.e., specialized setae) on the basal lobes of *pernotatus* and *scutellaris*. They made an important contribution to the methods of investigating the subgroup by the introduction of figures of the basal lobe in lateral as well as in tergal view. (They figured lateral views for *scutellaris* and *guamensis*, but the latter from comparison with specimens is more a tergal than truly lateral view.) They also stated " the thickened bristles of the basal lobe in *guamensis* are less developed than those in *pseudoscutellaris*[1]." This might have been interpreted as a reference to specialized setae in which case the specimens of "*pseudoscutellaris*" would be true *pseudoscutellaris*. However, their illustration is of *polynesiensis* and Dr. Alan Stone (*in litt.*) informs me that the setae of the basal lobe in the latter are all slightly heavier than in *guamensis*.

Farner & Bohart (1945) referred to *quasiscutellaris* as having " a row of somewhat thickened bristles " and " no specialized setal group." They described the basal lobe of *tongae* as " without a specialized group of stout setae ; large bristles confined to apex, particularly in ventral view." They had seen one male from Vavau, Tonga Is., and figured the lobe in dorsal and ventral view. I have examined the basal lobe of a male of *tongae* from Sikiana, Solomon Is. in lateral view and it has 9–10 specialized setae (Fig. 15). It is not easy to judge with specimens mounted in tergal view but another Sikiana male appears to have 6 or 7. Three males from Tonga have 5 to 7 specialized setae which appear less strongly developed and more tapered than in those from Sikiana.



FIGS. 15, 16. Left basal lobe of ♂ coxite of *Aedes tongae* Edwards from Sikiana, Solomon Is. Fig. 15. Inner lateral view. Fig. 16. Outer lateral view.

The same authors distinguished between " simple " (e. g., *tongae*) and " complex " (e.g., *quasiscutellaris*) basal lobes and noted whether the lobe is covered with minute setae tergally.

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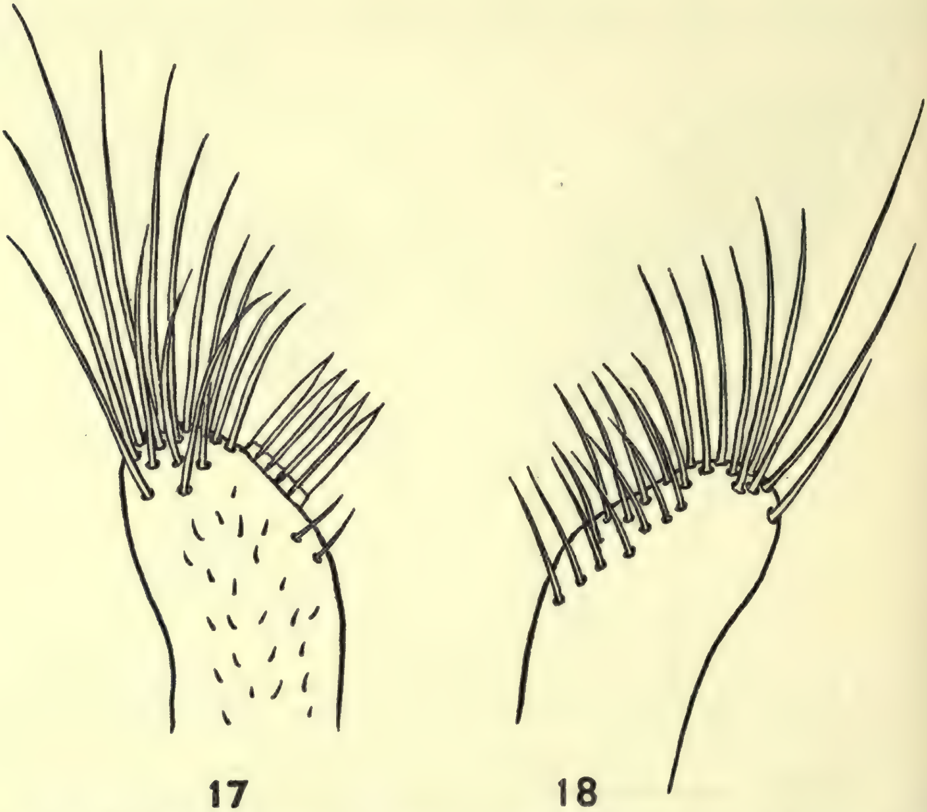
[1] Cf. Bohart & Ingram (1946*b*) who describe the basal lobe of "*pseudoscutellaris*" (= *polynesiensis*) as " largely covered with bristles, none of which appear as thickened setae."

Farner (1946) described the basal lobe of *hensilli* as similar to *guamensis* " but apparently with thickened bristles extending more basad." Bohart and Ingram (1946) distinguished two types of arrangement of specialized setae : " in a clump " in *scutellaris* as compared with " in a row " in *hensilli*.

The distinction is not a satisfactory one since an inner lateral view of the basal lobe of *s. scutellaris* shows the specialized setae in a row though in other views they often appear clumped. The basal lobe of *s. scutellaris* is square-ended in inner lateral view and the specialized setae are grouped on the sternal angle of the tip (this occurs also in *andrewsi*) whereas in *hensilli* and species with similar basal lobes the tip is more rounded and the row of specialized setae extends down the sternal aspect of the lobe. Woodhill (1949*a*) described the genitalia of *s. katherinensis* as indistinguishable from those of *s. scutellaris*, " the basal lobe of the coxite carrying a series of hairs at the apex with several longer hairs joined to form a spine. The degree of development of this spine varies in both subspecies . . . ." I have examined



FIGS. 17, 18. Left basal lobe of ♂ coxite of *Aedes guamensis* Farner & R. Bohart from Rota, Marianas. Fig. 17. Inner lateral view. Fig. 18. Outer lateral view.

specimens of *s. katherinensis* from Woodhill's colony. The " spine " is the group of specialized setae which, as in *s. scutellaris*, often appear clumped, but in inner lateral view they are seen as a row of about six setae. From this aspect the lobe differs somewhat in shape from *s. scutellaris* ; the tip is more conical without a distinct angle sternally, and the row of specialized setae extends down the sternal aspect.

Knight and Hurlbut (1949) figured only the tergal view of the genitalia of *hakanssoni* and described it as " quite similar to *riversi* and *hensilli* " which presumably means that specialized setae are present though this is not indicated in figure or text. I have examined a paratype of this species, and, though difficult to make out, there do appear to be 3 or 4 broader setae in a row among the non-specialized ones.

It was the observation of constantly-occurring specialized setae on the basal lobe of the coxite of specimens from the laboratory colony at Cambridge which first drew attention to the distinctness of this form (*pseudoscutellaris*) from the widely distributed Polynesian form (*polynesiensis*) usually referred to when the name " *pseudoscutellaris* " was used.

There is usually one aspect of the basal lobe which shows the characteristic shape of the lobe, and the specialized setae to best advantage.

In species with complex basal lobes, which appear expanded in tergal view, such as *quasiscutellaris*, *pernotatus*, *horrescens* and *alorensis*, this aspect shows all that is needed for identification. In a species such as *paullusi* with a simple truncate lobe, the setae all visible tergally and none of them specialized, the same view is again sufficient. Most of the species with basal lobe simple or expanded in lateral view have only a few long setae at the tip visible tergally. Thus Fig. 1 which shows this aspect of *pseudoscutellaris* is an equally good illustration of *polynesiensis* and *tongae*, and shows nothing except in proportionate lengths of the parts of the genitalia, to distinguish it from Rotuma sp. and possibly also from *hensilli*, *hakanssoni*, *riversi*, *guamensis* and *andrewsi*. On these same basal lobes, the unspecialized setae may occur only towards the apex or may extend varying distances towards the base—if the latter they may do so on the sternal aspect of the lobe, as in *polynesiensis* (when they are adequately illustrated from an inner lateral or, if there are no specialized setae, a sternal view), or more towards the outer lateral aspect as in *pseudoscutellaris*.

Practice has varied in illustrating the lateral aspect of the basal lobe. Thus figures of the lateral view of *s. scutellaris* in Farner & Bohart (1944, 1945), Bohart & Ingram (1946*b*) and Knight & Hull (1952) and of *s. katherinensis* in Woodhill (1949*a*) all appear to be of the outer lateral aspect ; whereas those of *hensilli* and *riversi* in Bohart and Ingram (1946*b*) appear to be of the inner lateral aspect. Where specialized setae occur in a row, the illustration must show them in file to display their number and shape ; this, in all species examined, is best seen from the inner lateral view. I have drawn the outer lateral aspect for a number of species and find that it shows quite distinctive arrangements of the unspecialized setae which would be valuable adjuncts to the characters of the specialized setae. Figs. 3–18 demonstrate the necessity for dissection of the genitalia in forms with a simple basal lobe, and for illustrations of more than one aspect of it, in order to show all the distinctive features.

Where the basal lobe is simple it might be useful to record its length relative to the length of the coxite, taking them from a given level (e.g., the outer lateral angle at the base of the coxite). This ratio appears to differ between *pseudoscutellaris*, *polynesiensis* and *tongae* on the one hand and Rotuma sp. on the other, though one would need to see more than the single available specimen of the latter to be satisfied on this point.

A few authors have recorded the number of apical teeth on the phallosome but there is insufficient information to suggest whether there may be specific differences in this character.

(3) *Zoogeography*

Mosquitoes of the *scutellaris* subgroup are found in the eastern part of the Oriental region and in almost all parts of the Australasian region that lie within the tropics, though their distribution on the tropical portion of the Australian mainland is apparently rather limited. They range from the Andaman Is. in the west, north-east to Okinawa and south-east to Mangareva Is. and Pitcairn I., i.e., from approximately 93° E. to 130° W. and from 26° N. to 25° S.[1]

The present known distribution of the various members of the subgroup is shown in the accompanying map.[2]

In addition to well-established records, a distinction has been made on the map between definite records of the *scutellaris* subgroup, where it is the identity of the species that is in doubt, and comprehensive records which include a whole island group within the range of a species, though the localities given for it cover only a small portion of that range. Where the range of two species overlap, the known limits of the overlap are shown.

Most species of the *scutellaris* subgroup are confined to islands or groups of islands and are plainly examples of the process of speciation by geographical isolation. The origins of the insect faunas of Pacific islands have been discussed by, amongst others, Buxton (1935) and Zimmerman (1948). They are derived mainly from the west and are largely Indo-Malayan in origin. Farner & Bohart (1945) considered that superficially the *scutellaris* subgroup " appears to be of Polynesian or Melanesian origin, having spread westward into the insular parts of the Oriental region " but they acknowledged that with further knowledge of the subgroup, it might be necessary to modify or discard this suggestion. There seems no reason to suppose that members of this subgroup have spread naturally in a different direction from other mosquitoes and other insects. Moreover, they include the easternmost representatives of the subgenus *Stegomyia*, which extends throughout the Oriental and Ethiopian regions, and this in itself is strong evidence that the subgroup originated somewhere in the western part of its range, where also it overlaps the range of the closely allied *albopictus* subgroup.

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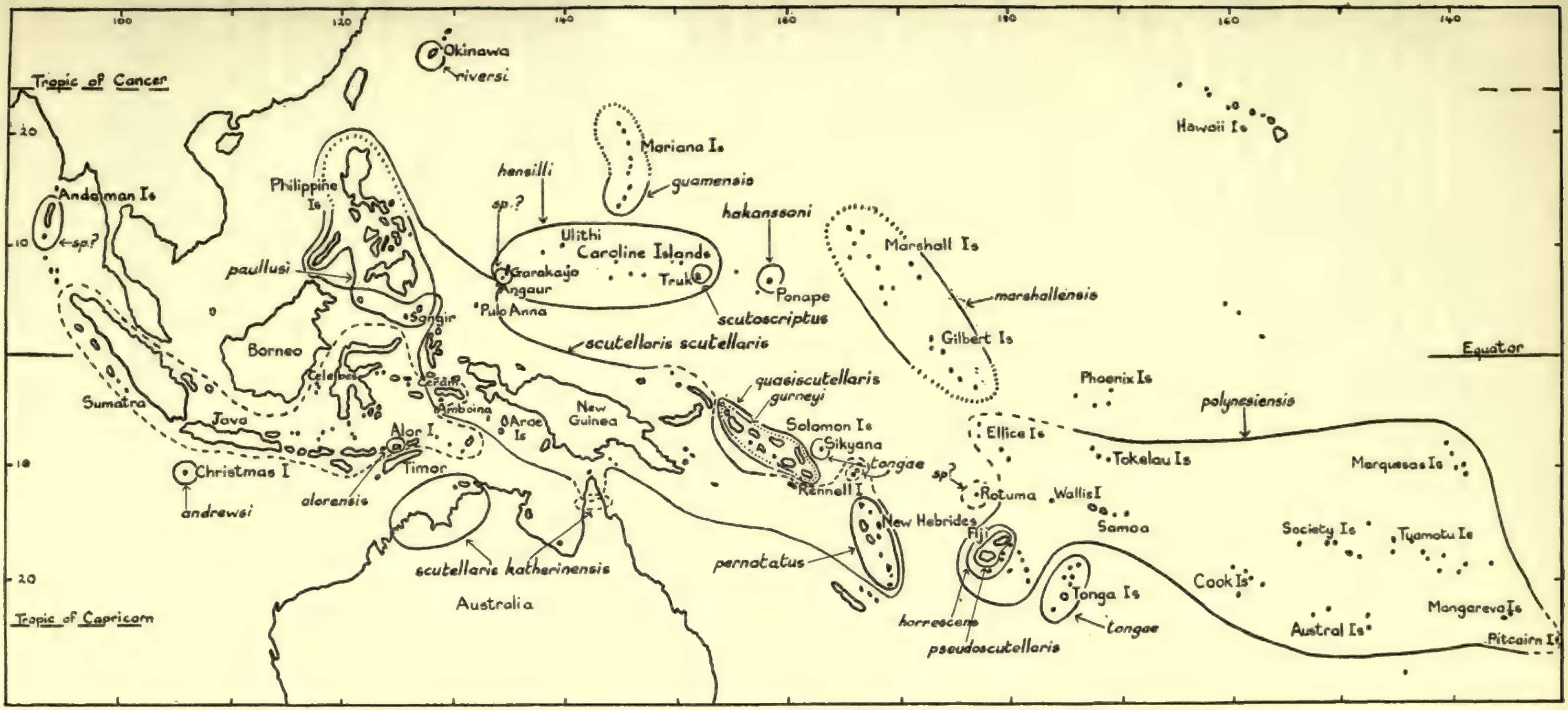
[1] The specimen of *scutellaris* subgroup from Maldive Is., reported by Mattingly (see footnote, p. 353) extends the range westward to approximately 74° E.

[2] A copy of an earlier version of this map appears in Manson-Bahr & Muggleton (1952). The original contained no reference to *Anopheles punctulatus farauti*, and the indication in the published map, that its southern boundary of distribution is coincident with that of *s. scutellaris*, is incorrect except in New Hebrides.


100
120
140
160
180
160
140
Tropic of Cancer
20
10
Equator
10
20
Tropic of Capricorn
Okinawa
riversi
Hawaii Is
Mariana Is
guamensis
Andaman Is
sp.?
Philippine Is
hensilli
sp.?
hakanssoni
Marshall Is
Ulithi
Caroline Islands
paullusi
Garakayo
Angaur
Truk
Ponape
marshallensis
Pulo Anna
scutoscriptus
Sangir
Gilbert Is
Borneo
scutellaris scutellaris
Sumatra
Celebes
Ceram
quasiscutellaris
gurneyi
Phoenix Is
polynesiensis
Amboina
Arae Is
New Guinea
Java
Alor I.
Solomon Is
Sikyana
Ellice Is
Tokelau Is
Marquesas Is
tongae
Christmas I
Timor
sp?
Rotuma
Wallis I
Rennell I
alorensis
andrewsi
New Hebrides
Samoa
Fiji
Society Is
Tyamotu Is
pernotatus
scutellaris katherinensis
Cook Is
Tonga Is
Australia
horrescens
tongae
Austral Is
Mangareva Is
pseudoscutellaris
Pitcairn I

Geographical Distribution of the *Aedes* (*Stegomyia*) *scutellaris* Subgroup.

——— Distribution of species definitely known.

. . . . Distribution of species assumed continuous throughout island group.

– – – – *scutellaris* group recorded but identity of species not confirmed.

Though many of the species of the *scutellaris* subgroup are isolated from their fellows, there are several cases where the ranges of two or three overlap. If the distribution is treated in terms of island groups, the overlap appears considerable, but when details of locality records are examined, it is found that in some cases, as far as at present known, it is of small extent.

Apart from the records of recognized forms—Andamans sp., *andrewsi* from Christmas I., *alorensis* from Alor and *s. scutellaris* from Ceram, Aroe Is. amd Moluccas—there are numerous records of "*scutellaris*" from islands of the Malay Archipelago which have not been reassessed since the existence of many distinct species in the *scutellaris* subgroup was recognized. Brug (1932), Bonne-Wepster & Brug (1932, 1937) and Brug & Bonne-Wepster (1947) record mosquitoes of the *scutellaris* subgroup from Sumatra, Java, Lesser Paternoster Is., Celebes, Boeton, Kaboena, Adonare, Tenimber, Boeroe, Sanana, Saparoea and Sumba.

Brug & Bonne-Wepster (1947) also record *paullusi* from Celebes, Ceram, Amboina, Sanana and Sumatra. Since it has now been found that *alorensis* has an anterior white line on the mid femur, it seems possible that some of these records may refer to *alorensis*. For this reason, until further information is available, these localities have not been included in the range of *paullusi* on the map, but remain in the area of species of unconfirmed identity. *Paullusi* is known with certainty from Sangir and the southern half of Philippine Is.; in the latter it overlaps the range of *s. scutellaris* which occurs throughout the group. To the north the subgroup extends to Okinawa, where one species, *riversi*, is found.

The Caroline Islands stretch from east to west over 2,000 miles and five species[1] are known from them—*s. scutellaris*, *hensilli*, *scutoscriptus*, *hakanssoni* and sp. from Palau group. In the latter islands, at the western end of the chain, *s. scutellaris* is the only species recorded from Pulo Anna and Angaur; on Peleliu and Garakayo both *hensilli* and "sp. in *scutellaris* group" have been found. To the north-east *hensilli* is the only species known from Ulithi Atoll, and still further east it is found on five islands of Truk Atoll, on four of which *scutoscriptus* also occurs. At the eastern end of the Carolines chain, *hakanssoni* is the only species of the group found on Ponape. It is a reasonable supposition that *hensilli* was formerly confined to Ulithi and perhaps other islands as yet uncollected, and has subsequently extended its range both east and west to overlap in each direction that of another form. North of Caroline Is., a single species, *guamensis*, is known from Mariana Is., and to the east another, *marshallensis*, from Marshall and Gilbert Is.

The Philippines and Carolines records of *s. scutellaris* represent the north-west limits of its range. It extends south through New Guinea and I have seen specimens from Hammond Is., Torres Straits, within about 20 miles of Cape York. In the eastern islands of Torres Straits it occurs on Murray, Darnley, Nepean and Yorke Is. The subspecies *s. katherinensis* is known from Northern Territory and northern West Australia. The situation in north Queensland is interesting and requires elucidation. Mackerras (1946) mentioned the occurrence of *scutellaris* in unsettled parts of Cape York Peninsula adjacent to Thursday I.; his specimens have not been available for examination. Of two females from the Red Island Point area near

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[1] Dr. R. M. Bohart has a sixth species, from Korror I. in the Palau group.

Cape York, one is apparently *s. scutellaris* with mid femora entirely dark anteriorly; the other has three white scales scattered along the anterior surface of its remaining mid femur. Of five females from the Coen district, about 200 miles south of Cape York, two from Skull Creek are badly damaged; the only remaining mid femur has three or four white scales scattered along its anterior surface. There are seven to fourteen white scales in this position in specimens from Coen and from Musgrave Station. The fifth specimen from Blue Mountains goldfield, has distinct but incomplete narrow lines of white scales on the anterior surface of its mid femora. In this it resembles one of Woodhill's *s. scutellaris* × *s. katherinensis* F^1 hybrids, rather than *s. katherinensis*. It must be remembered that *s. katherinensis* is known chiefly from specimens descended from one batch of eggs from Katherine, N.T., only six other specimens from two localities being recorded. It might be possible for the white line to vary to this extent in different stocks (cf., variation in white scaling on the proboscis of different stocks of *pseudoscutellaris* shown in Table V). On the other hand, Cape York Peninsula is the most likely place for a naturally interbreeding population of the two subspecies to occur. Whether or not this specimen is a hybrid, it indicates that *s. katherinensis* does occur on the Peninsula.

The north-east limits of *s. scutellaris* are Admiralty Is. and Bismarck Archipelago. As already noted, some Admiralty Is. specimens have atypical scutal or tarsal markings. Laird (1946) records *s. scutellaris* from New Britain, but Hill's (1925) record of "*variegatus*" from New Ireland has not been re-checked. Laird (1952) found *quasiscutellaris* on Nissan I., half-way between New Ireland and Solomons.

In the south-east *s. scutellaris* extends to New Hebrides where it occurs on numerous islands and overlaps the range of the local species, *pernotatus*. A possible physiological difference between *s. scutellaris* from New Guinea and New Hebrides is suggested by its incrimination as the vector of jungle dengue fever in New Guinea (Mackerras, 1946), whereas in New Hebrides Perry (1948) considered that it did not appear to be a vector of dengue in nature under normal conditions (though Daggy (1944) thought it a probable vector on epidemiological grounds). North of New Hebrides, Farner & Bohart (1945) quoted identifications of *s. scutellaris* from Rennell[1] and Bellona Is. in south-west Solomons, and of *s. scutellaris* and *tongae* from Nupani I. in Santa Cruz group. They considered these records needed confirmation by further collections.

The islands have been doubtfully included in the range of these species on the map.

In Solomon Is. both *quasiscutellaris* and the aberrant species, *gurneyi* are found; the latter has been recorded only from Bougainville and Guadalcanal. *Tongae* has been collected on Sikiana an outlying island east of the Solomons, but is the only species known both from there and from Tonga.

In the eastern part of the subgroup's range there are several species, females of which are very difficult to distinguish from one another. *Pseudoscutellaris* and *polynesiensis* have until recently been treated together as "*pseudoscutellaris*"[1] and Rotuma sp. females[2] may be indistinguishable from *polynesiensis*, as also are some females of *horrescens*. It has been possible to check many of the records by examination of males and *polynesiensis* appears to be the only widely distributed species in this area. Specimens collected by Dr. Marshall Laird on Nukonono I. have confirmed that *polynesiensis* occurs in the Tokelau group. Until males have been seen, some doubt must be felt in particular about records from Ellice Is. and Wallis I., which are nearest to the ranges of other members of the subgroup.

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[1] The identification of further specimens from these islands would be of particular interest. Professor G. D. Hale-Carpenter informs me (*in litt.*) that in its butterflies of the genus *Euploea*, Rennell differs considerably from other islands of the Solomons group, and it seems that it got some at least of its fauna directly from New Guinea's eastern tip via the Louisiade archipelago as stepping stones.

Theobald's (1907) record of "*scutellaris*" from Pitcairn I. seems to have been overlooked by later authors. Though Theobald at that time included both *albopictus* and *scutellaris* in his concept of "*scutellaris*," it is very unlikely that this record referred to *albopictus* and highly probable that it was *polynesiensis*.

In Fiji three species occur ; *polynesiensis* is here at the western limit of its range but *pseudoscutellaris* and *horrescens* are not known from elsewhere. Edwards (1935) suggested that *horrescens* might be the native Fiji form, and that "*pseudoscutellaris*" had been more recently introduced from Samoa. While it is likely that the wide-ranging *polynesiensis* is an introduction, not enough is known of the distribution of *pseudoscutellaris* to cast doubt on its endemicity. Though the most obvious explanation is that these sympatric species originally developed in geographical isolation, comparatively little is known of differences in their ecology which might affect speciation.[3] *Horrescens* does show differences in habits from "*pseudoscutellaris*," but now that the latter name is known to have covered two species, the subject needs re-examination.

The question arises why, when most of the species of the *scutellaris* subgroup have, as far as we know, a fairly restricted distribution, a few should have much more extensive ranges. The larval ecology of all is essentially similar, why should some species apparently be much more biologically aggressive than others ?

A study of the literature suggests that there may be some correlation between a species' ability to extend its range and a combination of avidity for human blood and ability to colonize artificial containers. The only forms for which both latter characteristics are recorded are *s. scutellaris*, "*pseudoscutellaris*" (= *polynesiensis*), *hensilli*, *quasiscutellaris* and *riversi*. With the exception of the last two, each of these species overlaps in its range at least two other members of the subgroup. Table II gives a summary of the recorded habits of the species.[4]

The inference to be drawn is that the activities of man have had much to do with the spread of these species and also that almost certainly they originally developed in geographic isolation somewhere within their present range. Buxton and Hopkins (1927) have put forward a strong case for the distribution of "*pseudoscutellaris*" (= *polynesiensis*) through the islands of Polynesia by the agency of Polynesian canoes. They similarly explain the occurrence of *tongae* on Sikiana; little has been recorded of the habits of *tongae*. Marks (1950) found that a percentage of *pseudoscutellaris* eggs could survive up to three weeks immersion in sea water, suggesting the possibility of dispersal in small floating vessels, such as coconut husks; however, it is now doubtful whether *pseudoscutellaris* is widely distributed.

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[1] Taylor's (1914) and Breinl's (1915) records of "*pseudoscutellaris*" from Papua can be assumed to refer to *s. scutellaris*.

[2] In one ♀ from Rotuma the ratio of the length of the white band on hind tarsal segment IV was 0·86 ; in one ♂, 0·79. This is longer than is usual in *pseudoscutellaris* and *polynesiensis*, and might prove a distinguishing character.

[3] Zimmerman (1948), as a result of his observations of insects on Pacific islands, considers that certain organisms appear to have selected certain environmental conditions. Rather than being what they are as the result of environmental influences, certain mutant forms seek out the niches best suited to them.

[4] Dr. R. M. Bohart informs me that Korror sp. breeds in pitcher plants and has a very distinctive larva.

The fact that certain forms of the *scutellaris* subgroup are known from the same localities without apparent intergrades justifies their treatment by taxonomists as full species, but further investigation is needed of forms which replace one another geographically. Huxley (1940) has emphasized the necessity for detailed mapping of the boundaries and range changes of species and subspecies. Many more records are needed before this can be attempted for the *scutellaris* subgroup.

(4) *Plate and Key for Identification of Adults*

Plate 18 includes the twenty-one known forms in the *scutellaris* subgroup[1] and, as indicated, eighteen have been actually examined, though in two of these male genitalia were not seen. The data included are based on a study of all descriptions and figures available, supplemented by direct observations on specimens, and by notes on *gurneyi*, *marshallensis*, *scutoscriptus*, *hakanssoni* and sp. from Palau group, kindly made by Dr. Alan Stone from specimens in U.S. National Museum.

The previous discussion of the diagnostic characters of the *scutellaris* subgroup indicates the variability of these in some species. Each figure therefore represents what, as far as can be judged from the information available, would be the condition in an average specimen of that series.[2] In several cases where characters vary considerably and both extremes are well represented, this has been shown by duplication of the parts concerned; in the case of *pseudoscutellaris* some of the variation obtained experimentally has been indicated thus.

All drawings, except those of the basal lobe, are conventional. For example, no attempt has been made to indicate the distance of the white band from the base of the tergite. The lengths of the tarsal segments are in their correct proportions, but the width has been exaggerated. The width of the white bands on the tarsal segments is the outer (i.e., greatest) width; where the bands are interrupted by dark scales this is shown in the same figure though in the actual specimens the interruption (except in *andrewsi*) is on the inner side.

The descriptions from which the figures are drawn vary in detail. *Hensilli* and *s. katherinensis* are fully described. *Marshallensis* is described on the basis of

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[1] Dr. R. M. Bohart has supplied the following details for Korror sp. of characters figured in Plate 1. *Proboscis*: no white scales on under side in female, a somewhat distinct line in male. *Scutum*: no white scales along anterolateral margin. *Scutellum*: silver scales on all lobes, black at apex of mid lobe. *Mid femur*: no anterior white line. *Hind femur*: anterior white marking sloping off ventrally, not tapering. *Hind tarsus*: white bands complete on II–V, covering $\frac{2}{5}$ III, $\frac{1}{2}$ IV, $\frac{3}{5}$ V. *Tergite V*: band usually, but not always, incomplete. *Basal lobe*: somewhat as in *riversi* but row of specialized setae in apical rather than subapical position.

[2] The faint line of yellowish brown scales under the proboscis of *scutoscriptus* has not been interpreted as a white streak.

TABLE II.—*Summary of Recorded Habits of Species of the* scutellaris *Subgroup**

Species	Bites man in nature	Coconut shells or husks	Breeding places.		Miscellaneous	Disease carried
			Artificial containers	Tree-holes		
guamensis†	Rarely	+	+	+	Cut bamboos, taro leaf axil	..
gurneyi	..	..	..	+	Swamp pond, pandanus leaf	..
hakanssoni	No	+	+	+	Rain barrels	..
hensilli	Yes	+	+	+	Rock crevices, fallen coconut fronds; not leaf axils	..
horrescens‡	..	+ (rare)	+	+	Tin, bamboos, tree-ferns, barrels	..
marshallensis	Yes	+	..	+	Well, base of coconut fronds	..
paullusi	"Hovering about"	+	..	+	Rock pools, fallen coconut fronds, bamboos	..
pernotatus	No	+	+	+	Axil of taro leaf	..
polynesiensis§	Yes	+	+	+	Crab holes, holes in cut bamboo; not leaf axils	Non-periodic filariasis, ? dengue.
quasiscutellaris	Yes	+	+	+	Leaf axils; holes in coral	Not dengue.
riversi	Yes	..	+	+	Small rock holes, cut bamboo	"Under suspicion."
scutellaris¶ *scutellaris*	Yes	+	+	+	Taro leaf axil, fallen coconut frond, split bamboo, puddle, well, canoe	Dengue (in New Guinea, apparently not in New Hebrides).
scutoscriptus	..	..	+	+	..	..
tongae	..	+	..	+	..	Assumed non-periodic filariasis.
Sp. from Palau	..	+	+	..	..	..

differences from *s. scutellaris* and *gurneyi* on the basis of differences from *albopictus*, but Dr. Stone has cleared up doubtful points for me. He has also provided a description of the characters illustrated for sp. from Palau group, of which only brief details were given by Bohart and Ingram (1946*b*). The illustration of the basal lobe of this species is copied from a sketch supplied by Dr. Stone; he describes the lobe as follows: "The apex is somewhat angular, almost as in *marshallensis*, but lacking the two stout spines; the hairs of the apex of the lobe (mediad) are thickened and curved and form a very distinct curved tuft." Bohart and Ingram's notes on the hind tarsus differ from Dr. Stone's, so both have been illustrated.

The differences in the figures of the basal lobe are probably in some cases more apparent than real and in others more real than apparent since they are from various sources. The drawing of the basal lobe of *scutoscriptus* is enlarged from a small figure of the complete genitalia and possibly suggests a closer resemblance to *pernotatus* and *alorensis* than actually exists. Dr. Stone informs me (*in litt.*) that an examination of the type slide of *riversi* shows the basal lobe to be more as in *s. katherinensis* than would appear from the figure in the chart.

Some species show the distinctive shape and specialized setae of the basal lobe best in tergal view. In others an inner lateral view is essential for correct interpretation. It is believed that the figures are drawn to meet these requirements. Unfortunately, sp. from Rotuma does not show the specialized setae in tergal view, and since a second male was not available from which a mount in lateral aspect could be made, the basal lobe is figured in sternal view; this figure is therefore not directly comparable with any of the others.

It was thought proper to show a distinction between freehand and scale drawings. The former were made during visits to the British Museum (Natural History) and though they are believed to give an accurate representation, it was not possible to give the same time and care to details as in specimens which were examined in the laboratory in Cambridge or Brisbane; the latter were drawn to scale.

The species are arranged in Plate 18 as far as possible in their geographical relation-

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[*] No information is available on the habits in nature of spp. from Andaman Is., or Rotuma I., nor of *andrewsi*, *alorensis*, *pseudoscutellaris* or *s. katherinensis*; laboratory colonies of the last two feed readily on man. Bahr (1912) had both *polynesiensis* and *pseudoscutellaris* amongst the mosquitoes used when he proved "*pseudoscutellaris*" the vector of filariasis in Fiji (see Marks, 1951).

[†] Bohart & Ingram (1946*b*) report that adults of *guamensis* "are rarely seen in nature and have never been observed to bite man even in heavily breeding areas". Reeves & Rudnick (1951) record 21 specimens of *guamensis* in a collection of 7767 mosquitoes taken biting man. Farner & Bohart (1945) quote Fullaway's report in 1912 of this species as "very abundant and troublesome in the forests" but it seems unlikely that this referred to *guamensis*. Laboratory experiments of Travis (1947) showed that *guamensis* would not feed readily on a dog but that in 68% of those which did, larvae of *Dirofilaria immitis* developed to the infective stage.

[‡] Manson-Bahr & Muggleton (1952) found that adults of *horrescens* reared in the laboratory fed reluctantly on human blood and concluded from their experiments that this species was unlikely to be a suitable host for the local non-periodic filaria.

[§] Buxton & Hopkins' (1927) records of breeding places of "*pseudoscutellaris*" refer to *polynesiensis*, the only species of the subgroup known from Samoa. Paine (1943) gives a long list of breeding places of "*pseudoscutellaris*" in Fiji but these may refer either to *pseudoscutellaris* or to *polynesiensis*. Perry (1950) quotes a personal communication from Lever reporting that "*pseudoscutellaris*" was an important agent in the transmission of dengue in Fiji—this might apply to either or both *pseudoscutellaris* or *polynesiensis*.

[¶] Backhouse & Heydon (1950) found *scutellaris* inhospitable to *Wuchereria bancrofti* in the Rabaul region.

ships, so that those next to one on the plate are those nearest to it on the map. This was more difficult with species in the eastern part of the range of the group, and for interpretation of apparent trends in characters, the plate should be used in conjunction with the map.

It is hoped that the plate may overcome certain disadvantages of keys and tables. The visual presentation directs attention to resemblances and differences and the geographical arrangement brings out trends in characters and suggests relationships, some of them quite unexpected, which might otherwise escape notice. If an undescribed form were encountered, the plate should indicate the fact more strongly than a key can. Like keys and tables, however, the plate is not more than a preliminary guide and final identifications should always be made by reference to full published descriptions.

Though the plate was designed for use on its own, it might prove more useful in the field if a key were available or a preliminary guide. The following key has therefore been prepared. It gives a good indication of the necessity for examination of male genitalia for certain identification of a species. The plate obviates the need for a key to male genitalia.

KEY TO ADULTS OF THE *scutellaris* SUBGROUP

(Median white line on scutum relatively slender; hind tarsal segments I–IV basally banded, V basally banded or all white.)

1. Abdominal tergal markings basal; pleural markings in patches . *albopictus* subgroup.
   Abdominal tergal markings with more mesal portions basal; pleural markings in longitudinal bands; costa with white line on basal third . . . . *granti*.
   Abdominal tergal markings with more mesal portions sub-basal; costa all dark or with small basal white patch . . . . . *scutellaris* subgroup 2.
2. Pleural markings in patches . . . . *gurneyi*.
   Pleural markings in longitudinal bands . . . . 3.
3. Hind femur with white marking on anterior surface sloping off ventrally towards apex[1] 4.
   Hind femur with white marking on anterior surface tapering towards apex . . 7.
4. Abdominal tergites with triangular white lateral markings . . . . *guamensis*.
   Abdominal tergites with lunate white lateral markings . . . . . . 5.
5. Scutellum with patches of dark scales on all lobes; hind tarsal V with apical half or more completely dark[2] . . . . *hakanssoni*.
   Scutellum with small patch of dark scales at apex of mid lobe only; hind tarsal V white to apex on outer aspect . . . . 6.
6. Scutum with wide white line along anterolateral margin; abdominal tergites with lateral patches only . . . . *scutoscriptus*.
   Scutum dark on anterolateral margin; some abdominal tergites with complete bands . . . . Palau sp.

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[1] Since going to press I have seen four ♀♀ of *marshallensis* collected by Dr. M. Laird on Teaoraereke I., off Tarawa, Gilbert Is., in which the ventral dark scaling on hind femur is reduced; in two specimens the white marking on anterior surface still appears tapering, but in two it slopes off ventrally towards apex; the latter would key to the second half of couplet 5, being distinguished by the dark apical half of a hind tarsal V.

[2] Dr. R. M. Bohart has supplied the following note: Korror sp. keys out to couplet 5 but has hind tarsal V about $\frac{2}{3}$ dark all around. Otherwise it agrees with the second half of the couplet and goes on to couplet 6 where it differs from either part by tergites sometimes having lateral patches only and scutum always dark on anterolateral margin.

7. Mid femur with longitudinal white line on anterior surface . . . . 8.
   Mid femur dark on anterior surface . . . . 10.
8. Scutum with narrow white line along anterolateral margin . . . . . *paullusi.*
   Scutum dark on anterolateral margin . . . . 9.
9. Proboscis with white streak ventrally . . . . *alorensis.*[1]
   Proboscis dark ventrally . . . . *scutellaris katherinensis*
10. Scutum with complete or incomplete narrow white or yellowish line along anterolateral margin (at least, not less than five white scales) . . . . . . 11.
    Scutum dark on anterolateral margin (at most, less than five white scales on scutal angle) . . . . 12.
11. Some abdominal tergites with complete bands . . . . . . *quasiscutellaris.*[2]
    Abdominal tergites never with complete bands . . . . . *pseudoscutellaris.*
12. Hind tarsal V with black apex ; some abdominal tergites with complete bands . 13.
    Hind tarsal V white to apex on outer aspect . . . . 14.
13. Length of white band on hind tarsal IV, 0·2–0·4 ; on hind tarsal V, 0·2–0·5 length of segment . . . . *marshallensis.*
    Length of white band on hind tarsal IV, 0·3–0·6 ; on hind tarsal V, 0·4–1·0 length of segment . . . . *hensilli.*[3]
14. Some abdominal tergites with complete bands . . . . 15.
    Abdominal tergites with incomplete dotted bands, or with lateral patches . . 16.
15. Proboscis with white streak ventrally . . . . Andamans sp.
    Proboscis dark ventrally . . . . *scutellaris scutellaris.*
16. Some abdominal tergites with almost complete dotted bands ; proboscis with white streak ventrally . . . . 17.[4]
    Abdominal tergites with lateral patches only . . . . 18.
17. White scaling on one or more of hind tarsals III–V interrupted by dark scales on inner aspect . . . . *tongae* (in part).
    White scaling on hind tarsals III–V not interrupted *riversi, horrescens, tongae* (in part).
18. Proboscis with white streak ventrally . . . . *pernotatus.*[5]
    Proboscis dark ventrally . . . . 19.
19. White band on hind tarsal IV interrupted by dark scales on outer aspect . *andrewsi.*
    White band on hind tarsal IV not interrupted . . . . 20.
20. Length of white band on hind tarsal IV, not less than 0·8 length of segment Rotuma sp.
    Length of white band on hind tarsal IV usually less than 0·8 length of segment *polynesiensis.*[6]

(5) *Interspecific Relationships*

In considering the relationships of the species it can be seen from Plate 18 that different characters show trends in different directions. Where the affinities thus implied conflict with one another, it is impossible to say which is indicative of closer relationship. The tendency might be to regard the genitalia characters as of greatest importance. However, Woodhill (1950) has shown that differences in the basal lobe between *s. scutellaris* and *pseudoscutellaris* are not mechanical barriers to cross fertilization ; such differences therefore must be regarded from the same morphological standpoint as any other characters.

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[1] *Alorensis* is known only from one ♂; it is probable that *paullusi* ♀♀ with reduced anterolateral markings on scutum would be difficult to separate from *alorensis* ♀♀.

[2] Aberrant *s. scutellaris* from Admiralty Is. would key out here ; *quasiscutellaris* with reduced line on scutum may key to *s. scutellaris.*

[3] Aberrant *s. scutellaris* from Admiralty Is. and New Hebrides would key out here ; *hensilli* with hind tarsal V completely white will key to *s. scutellaris.*

[4] Some specimens of *s. scutellaris* have dotted bands and would key to couplet 16, but have no ventral white streak on proboscis.

[5] Some specimens of *horrescens* and *polynesiensis* may key out here ; some specimens of *pernotatus* will key to *andrewsi* but the interruption to the hind tarsal bands is on the inner aspect.

[6] Some specimens of *horrescens, pernotatus* and *andrewsi* may key out here.

The *Aedes* (*Finlaya*) *kochi* group of mosquitoes has a similar distribution to that of the *scutellaris* subgroup though it does not extend quite so far into the Pacific. Marks (1947) observed that neither general coloration, nor structure of genitalia in the *kochi* group showed any obvious relationship to geographical distribution, but suggested that the affinities from New Guinea east might be traced in the larvae since the structure of the teeth of the lateral comb did appear to be related to geographical distribution. It would be exceedingly difficult to trace affinities in the larvae of the *scutellaris* subgroup, since many of them are so alike that they can only be identified doubtfully, if at all ; adult characters are a more promising field.

The white scaling on the proboscis is frequently a variable character and the trends it shows in distribution may be open to question. Species with a white stripe under the proboscis extend from Andaman Is. east to Alor (*alorensis*) and Philippines (*paullusi*) and north of the latter to Okinawa (*riversi*) ; there is a gap in distribution then as far as Solomon Is.[1] (*quasiscutellaris*), to the east of which the character appears in Sikyana and Tonga (*tongae*), New Hebrides (*pernotatus*) and Fiji (*horrescens* and sometimes *pseudoscutellaris*).

White scaling on the anterolateral margin of the scutum links *paullusi* in the Philippines east to the Caroline species *scutoscriptus* on Truk and *hakanssoni* on Ponape, south to aberrant *s. scutellaris* in Admiralty Is. and *quasiscutellaris* in Solomon Is., and east again to *pseudoscutellaris* in Fiji.

Since *hakanssoni* is the only species with distinctive scutellar scaling this character cannot be considered.

Species with a white anterior streak on the mid femur have a north-south distribution from Philippines to northern Australia, these are *paullusi*, *alorensis* and *s. katherinensis*. Dr. Alan Stone informs me (*in litt.*) that the mid femur of the type specimen of *riversi* " has a very narrow border of pale yellowish scales along the lower margin." Most species have pale scaling along the lower posterior margin of the mid femur and this sometimes extends on to the anterior margin. I have seen a specimen of *s. scutellaris* with a distinct white border along the lower anterior margin of the mid femur and probably the condition in *riversi* is comparable with this and not with the medially placed anterior streak of *paullusi*.

Four species are linked by having the white anterior scaling on the hind femur sloping off apically, instead of tapered as in the remaining seventeen forms. This character is found only in specimens from Marianas (*guamensis*) and Carolines (sp. from Palau, *scutoscriptus* from Truk and *hakanssoni* from Ponape).[2]

On the hind tarsi, the absence of a dark interruption to the band on segment I brings together species in the western part of the subgroup's range, Andamans sp., *alorensis*, *s. katherinensis* with *gurneyi* from Solomon Is. in the east, and sp. from Palau and *riversi* from Okinawa in the north.

There is a reduction in the width of the white hind tarsal bands linking species in

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[1] The occurrence of related forms in Moluccas area and in Solomon Is. without intermediates in New Guinea is known in Lepidoptera (Zeuner, 1943) and Odonata (Lieftinck, 1949) and has been explained by Zeuner (*l.c.*) in terms of the theory of continental drift.

[2] Also in some specimens of *marshallensis* from Gilbert Is. (see p. 382).

a west-east line, *hensilli* in the western Carolines, *scutoscriptus* on Truk, *hakanssoni* on Ponape and *marshallensis* from Marshall and Gilbert Is.; these, except *scutoscriptus*, also have in common a black apical half to segment V (white in all other species and sometimes in *hensilli*).

Species which may have segments III–V or IV–V interrupted by a line of dark scales beneath, extend south-east from Marianas (*guamensis*) through Carolines (sp. from Palau, *scutoscriptus* from Truk, *hakanssoni* from Ponape) to Sikyana in Solomons, and Tonga (*tongae*); *pseudoscutellaris* in Fiji may show this character in certain environmental conditions, and it may occur in aberrant *pernotatus*. Far west of these species, *andrewsi* may have the band on segment IV interrupted, but dorsally, not ventrally.

Complete abdominal bands are found in species in the western and central part of the subgroup's range, from Andaman Is. sp., *alorensis* (Alor), *s. katherinensis* (N. Australia), *paullusi* (Philippines), *hensilli* and sp. from Palau (Carolines), *s. scutellaris* (New Guinea, etc.) to *quasiscutellaris* and *gurneyi* in Solomons, and north-east to *marshallensis* (Marshalls and Gilberts). On the outskirts of this distribution almost complete abdominal bands are found to the north, in *riversi* (Okinawa) and to the east in *tongae* (Sikiana and Tonga) and *horrescens* (Fiji).

The species which have only curving lateral patches on the abdominal tergites are found from Caroline Is. (*scutoscriptus, hakanssoni*) south-east to Rotuma sp. and *pseudoscutellaris* (Fiji) with *polynesiensis* ranging east from Fiji, and to the west, *pernotatus* in New Hebrides. North of Caroline Is., *guamensis* also has lateral patches but these are of distinctive shape. The exception to this distribution pattern is *andrewsi* from Christmas Is., far removed from the other species with lateral patches.

When one examines the form of the basal lobe, there is one particularly well-defined type, a simple lobe with a row of specialized setae along its sternal aspect. This can be traced from Okinawa (*riversi*) south-east through Marianas (*guamensis*), Caroline Is. (*hensilli* in the east, *hakanssoni* in the west) to Sikyana and Tonga (*tongae*) and Fiji (*pseudoscutellaris*). Rotuma sp. may be allied to this type and *polynesiensis* is essentially similar but has lost the specialized setae. Other species with a simple basal lobe are found in the western parts of the subgroup's range. The specialized setae are at the apex in Andaman Is. sp. and *andrewsi*, while *paullusi* has only non-specialized setae arising from its truncate apex. Though slightly expanded in lateral view the basal lobes of *s. scutellaris* and *s. katherinensis* are essentially similar to the simple type. There is a fairly close resemblance between *andrewsi* and *s. scutellaris*, both of which have the specialized setae set on the sternal angle of the tip; Dr. Stone has noted a resemblance between *riversi* and *s. katherinensis*.

Quite a different form of lobe is that with an elongated somewhat flattened apex, with specialized setae borne on its inner projection (i.e., towards midline of genitalia). This is found in the East Indian species *alorensis* (Alor) and in *pernotatus* (New Hebrides); *scutoscriptus* (Caroline Is.) appears to be similar; *quasiscutellaris* (Solomons) and *horrescens* (Fiji) though rather different, might be derived from this form; *gurneyi* which lacks specialized setae could be derived either from this, or from further flattening of the apex of a lobe of *paullusi* type. *Marshallensis* has a similar inner projection, but the apex of the lobe is produced, not flattened, and it could derive almost equally well from the simple lobe first discussed ; sp. from Palau is apparently most like *marshallensis* but without specialized setae on the inner projection.

Although the distribution of the different characters may suggest different affinities, it is clear that (with one exception) there is a very definite west-east trend (as already pointed out, it is unlikely to be east-west), which is in accordance with known relationships of the fauna of Pacific islands. The notable exception is the north-south distribution of mid-femur pattern, but this is in the Indo-Australian portion of the range, where distribution of the fauna is a more complex problem.

(6) *Immature Stages*

Although, as already detailed, it was differences between larvae from different areas that first led to the recognition of the *scutellaris* subgroup, Farner & Bohart (1944) justly observed "An effective systematic revision of the larvae must await the availability of greater amounts of reared and associated material as well as a critical study of the taxonomic characters." No one has yet produced such a revision.

No details have been recorded of larvae of *andrewsi*, *alorensis*, *gurneyi*, *tongae* or spp. from Rotuma, Palau group and Andaman Is., though all except possibly *andrewsi*, *alorensis* and Rotuma sp. have been reared from larvae. Descriptions available for larvae of the other forms vary in their completeness from Woodhill's (1949*a*) note on the larvae of *s. katherinensis* " indistinguishable from those of *Aedes scutellaris scutellaris* " to Knight & Hurlbut's (1949) detailed account of the larva of *hakanssoni*.

Various authors have found characters for distinguishing the larvae where two species occur in the one locality. Edwards (1935) tabulated characters for separating larvae of *horrescens*[1] and " *pseudoscutellaris* " (Fiji) and indeed it was the observation of two distinct larval forms which led to the recognition of *horrescens* as a distinct species. Larvae of *pseudoscutellaris* and *polynesiensis* can be separated on the relative lengths of their gills (Marks, 1951*b*) so that the three Fijian species are identifiable. Perry (1944) gave key characters for distinguishing the larvae of *s. scutellaris* and *pernotatus* (New Hebrides). Bohart & Ingram (1946*b*) were able to distinguish *hensilli* larvae from those of *scutoscriptus* and sp. from Palau (Caroline Is.).

Belkin (1950) provided a system of nomenclature for the complete chaetotaxy of a culicine larva. With the aid of this and adequate representative larval material of the various species, it would very likely be found that many of the larvae could be identified on a combination of characters, as are the adults, and possibly some trends in the distribution of characters would appear. For example, examination of a small number of larvae of *pseudoscutellaris* and *polynesiensis* has suggested that hair 2 of abdominal segments III–VII is frequently single in *pseudoscutellaris* and rarely so in *polynesiensis*. Long series from varied localities are essential for evaluation of characters such as this. Our present knowledge is quite inadequate for preparation of a key to the larvae of the subgroup or for useful discussion of the specific larval characters.

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[1] Edwards gives a series of distinctive characters. The presence of multi-branched hairs on thorax and abdomen is not by itself sufficient to identify a specimen as *horrescens*, since occasionally these hairs are fairly heavily branched in larvae of *pseudoscutellaris* and *polynesiensis*.

No attempt has been made to separate species on pupal characters and the pupal stages have in general been ignored though Knight & Hurlbut (1949) give details of the pupa of *hakanssoni*, and Penn (1949) describes that of *s. scutellaris*.

The eggs of all species, so far as is known, appear identical but no comparative measurements for different species have been recorded.

III. EXPERIMENTAL STUDIES OF VARIATION IN *AEDES PSEUDOSCUTELLARIS* (THEOBALD)

(1) *Introductory*

The characters by which a culicidologist distinguishes the various members of the *scutellaris* subgroup from one another have already been discussed in detail.

Descriptions of some species indicated a certain amount of variation in several of the diagnostic characters. It was decided therefore to take a single species and investigate the extent to which such morphological characters of the adults could be affected by controlled variation of the larval environment. The results would give some indication of the reliability of the different characters for taxonomic purposes, and the factors involved in their phenotypic variation. They might thereby provide some evidence on the validity of the specific status accorded to the form investigated.

The common diagnostic characters of the subgroup were chosen for biometrical study. These all (except on the genitalia) concern the proportions of white scaling to black. Some additional characters of this type were studied, in view of their possible taxonomic use and also to discover whether they varied in a similar fashion to the rest. The measure usually given to indicate size of mosquitoes is the wing-length. This was recorded, and also for comparison, the length of the hind femur. It is a well-known zoological fact that size varies considerably with the temperature of the animal's environment, as well as from other causes such as, in mosquitoes, abundance of larval food.

In addition to these two measurements, the following characters were examined (each is discussed in further detail in conjunction with its appropriate table) :

White scales under the proboscis ; white scales on the anterolateral margin of the scutum ; white scales in front of the prescutellar bare area ; white patches at the bases of fore and mid tarsal segments ; extent of anterior white streak and of dark ventral scaling on hind femur ; greatest length of white bands on hind tarsi ; and least length (i.e., the extent to which they are interrupted beneath) ; distance between the lateral patches on abdominal tergites V and VI ; number of specialized setae on the basal lobe of the male coxite.

Variation was apparent also in several characters which were not investigated biometrically. In females bred at 15–16° C., the median white stripe on the scutum was the width of about five scales across, whereas at 30–32° C., it was 9 or 10 scales across. At 30–32° C., broad appressed white scales were developed in certain sites where at lower temperatures the white scales were narrow curved.[1] This was particularly marked on the anterior margin of the scutum at the commencement of the median white stripe (some specimens from $\frac{1}{3}$ sea-water were similarly affected); a few broad scales were frequently present also at the posterior extremity of the median stripe, and on the scutal angle.

The studies of variation described herein were made on specimens derived from a laboratory colony, a small population which had been inbred for many generations. Though it seems probable that small populations are favourable to relatively rapid evolution (Mayr, 1942; Ford, 1949), they often show reduced variability due to accidental gene loss or genetically limited ancestry. It is therefore likely that the amount of variation observed in this stock is less than would occur in a natural population subject to the same conditions; this is confirmed by a comparison with material from a colony of different origin. However, the specimens have been reared in controlled conditions, so that what variation does occur can be related to the variation in the environment.

Conditions were not controlled rigidly and the experiments were spread over a period of approximately sixteen months. It is therefore not surprising that when some of the series were tested for homogeneity in several cases appreciable heterogeneity was found. In this kind of exploratory work it is not necessary to make very precise measurements of the effect on each series of changing one factor in the environment and the interest is mainly in the qualitative differences. Nevertheless, comparison between Series F, C, B and E, in which the temperature was progressively raised while other conditions were the same, is very constant wherever any positive effect occurs at all.

The effects of the different treatments are illustrated in Tables III–XX. In certain cases where these were not clear-cut and it was a matter of interest to examine them further, their significance was tested statistically. In the tables, where specimens fall on the limits of two ratio groupings, they have in all cases been placed in the lower category.

(2) *Material*

The species chosen for investigation was *Aedes* (*Stegomyia*) *pseudoscutellaris* (Theobald) of which a culture was obtained from the following source:

The late Mr. D. W. Amos in August, 1948, sent by air larvae (all stages) of "*pseudoscutellaris*" from Fiji to Sir Philip Manson-Bahr in London. No particulars are now available of the number of specimens with which the colony was started, nor of the exact locality from which they had been collected, though it is believed to have been Suva. Mr. P. G. Shute established the laboratory colony and it was subsequently maintained as a continuously breeding population in the Parasitology Department of the London School of Hygiene and Tropical Medicine. From thence a sample of all stages from egg to pupa was obtained in November, 1949. Approximately 350 adults were reared from it and their progeny are regarded as the first (Cambridge) generation. The studies of variation were made on specimens from this stock. Whether the original stock from Fiji was a pure culture of *pseudoscutellaris* is unknown, but there is no doubt that the sample brought to Cambridge was a pure culture of this species.

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[1] It would be interesting to know what factor is responsible for the development of a scale in one or other of two such distinct shapes. The distinction between narrow and broad scales on a given site is often used to separate species or even subgenera of mosquitoes.

A second stock of *pseudoscutellaris* was received from Mr. B. A. O'Connor in April, 1951, direct from Fiji. This consisted of a batch of about 120 eggs obtained from wild-caught males and females, collected 10th–16th March at Naduruloulou Agricultural station (about 12 miles in a direct line east of north from Suva). Approximately 60 adults were obtained from this sample, and their progeny, reared under standard conditions, were compared with the other stock.

(3) *Methods*

(*a*) Rearing

The design of the experiments required that the conditions in which larvae were reared should be controlled, though highly refined techniques and rigorous control of all conditions were deemed unnecessary. A continuous breeding colony was not maintained; egg batches were hatched as required and the larvae reared with the following standard technique.

Breeding bowls were kept at the required temperature in thermostatically controlled incubators or in a constant temperature room. Straight sided glass bowls of varying capacity were used.

Larvae. The liquid contents of the bowl in which the eggs were to be submerged consisted of tap-water, " larval essence " and a small amount of larval food.

" Larval essence," used as a hatching stimulus,[1] was the filtered liquor in which a previous culture of larvae had been reared. It was stored in a jar and used as required in amounts of approximately 30–100 c.c. per bowl. The quantity was not standardized since there was no means of standardizing the quality.

The size of bowl and the volume of tap-water used were adjusted to the number of eggs to be hatched so that overcrowding of larvae was avoided.

Larval food consisted of a mixture of equal parts by volume of finely ground Bemax and two types of dog-biscuit, one of which contained meat-meal. It was fed either in aqueous suspension or the powder sprinkled directly on the surface of the medium. Larvae were fed as necessary, usually daily or every second day. Enough food was added to keep the liquid slightly cloudy, but to avoid formation of a scum. The medium soon developed a rich culture of micro-organisms and it is likely that these formed the bulk of the material actually ingested by the larvae.

Salinity. Specific gravity measurements made with an immersion hydrometer indicated no increase of salinity in tap-water culture media at completion of rearing at 25°–28° C., and in essence, when compared with tap-water at similar temperatures.

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[1] Numerous workers have found that the presence of micro-organisms is one of the many factors that stimulate hatching in *Aedes* eggs, including Buxton and Hopkins (1927) in their studies of " *pseudoscutellaris* " (= *polynesiensis*). The effect of the " essence " may have been through the micro-organisms it introduced to the medium.

When rearings were made in diluted sea-water, the salinity was estimated by the method described by Harvey (1928) of titration with silver nitrate solution. The corrections he gives were applied and the results recorded in parts per thousand (‰) to the first decimal place. The salinity of selected samples from other conditions was measured in the same way.

Air. Compressed air was bubbled slowly through the larval medium ; if this was not done a scum formed on the surface and larvae and pupae drowned.

Pupae were collected daily or every second day and transferred to a dish of clean water in a cage ; in other respects the pupae were subjected to the same variations in environment as the corresponding larvae. When all pupae in the dish had emerged, the cage was transferred to a constant temperature room at 24–26° C.

Adults of all series were kept in cages (8 in. cubes or larger) in a constant temperature room at 24–26° C. The humidity of the room varied, but glass bowls with moist filter paper or porous earthenware pots of water were placed in the cages to provide moisture. Most specimens required for subsequent examination were killed 24–48 hours after emergence.

No food was given other than blood meals. The source of these was usually man, less frequently rabbit and once chicken. A blood meal was offered when the majority of females in the cage were 3–5 days old and continued long enough for numerous specimens to engorge (usually 20–30 minutes). Sometimes a second meal was given on a later day. Porous earthenware pots containing water were provided for oviposition. They were removed within 7 days of the blood meal and the water decanted, but the pots were kept moist for a further 1–2 days. They were stored in the constant temperature room at 24–26° C. and shards with the required quantity of eggs broken off when needed. Where egg batches were obtained from individual adults, these were laid on moist filter paper in a glass tube.

Specimens for study were usually pinned through the side as this was least likely to damage the characters studied. Each specimen received a label with its series letter (indicative of the conditions of rearing) and a serial number.

Records. Day by day records were kept for each batch of larvae reared. These included source and approximate or exact number of eggs ; date submerged ; particulars of medium ; number of pupae collected ; emergence of adults (in certain samples the proportions of the sexes were recorded from a count of pupal skins) ; date and source of blood meal ; date of oviposition.

(*b*) Sampling

Sampling was at two levels, firstly from the total of adults reared in a batch, secondly from the collection of pinned specimens. In all cases damaged specimens were rejected. In the case of progeny of individual females, all suitable adults reared were pinned. With large collections of adults of mixed parentage, if none were needed for breeding, all were killed and the required number of specimens pinned. If it was desired to breed from the adults, each specimen for pinning was captured by hand in a glass tube. This method was found more satisfactory than an aspirator for the purpose of obtaining perfect specimens.

Pupation of a batch of larvae extended over a period of days. The pupae (and adults emerged therefrom) in lots representing 1, 2 or 3 days pupation were kept in separate cages until samples had been taken. The majority of males emerged in the first few days, while the proportion of females gradually increased. The proportion of each sex to be pinned from any particular cage was in several cases known accurately from a count of sexes of the pupal skins. In most cases the numbers were estimated in the light of this experience, by direct observation of the adults to be sampled. The serial number of a pinned specimen indicated the batch from which it came and also the collection of pupae within that batch. The specimens examined represented proportionately the number pinned from each pupal collection within the batch. In this way a representative cross-section of the population was obtained.

It should be made clear, however, that though equal numbers of each sex from a batch might be pinned and equal numbers examined, the numbers of each sex actually reared in that batch were not necessarily equal.

From the males examined, a smaller number were selected on the same principle for dissection of the genitalia.

(*c*) Examination of specimens

The characters of the external morphology of the specimens were examined with a binocular dissecting microscope. Measurements were read on an eyepiece micrometer with divisions of 0·1 mm.; using × 7 eyepieces and × 5 objective, 38 divisions of the scale represented 1 mm.

A rotating insect stage was used for orientating specimens for examination of characters.

Only one leg or wing (the one most easy to observe) was measured on each specimen.

Genitalia. The technique employed was a simple one which facilitated the preparation of a large number of mounts.

The specimen was relaxed and the terminal segments cut off and transferred to a small tube of 10% potassium hydroxide. This was set in a beaker of water, which was heated to boiling-point, and it was allowed to remain in the hot water for 5 minutes. The genitalia were transferred to a watch glass of distilled water, plus acetic acid. After five minutes they were transferred to cellosolve on an excavated slide and then dissected. With a straight surgical needle the genitalia were divided longitudinally into two halves, the basal lobe of one half was detached with the aid of fine steel pins.[1]

The parts were transferred to chloral gum medium on a slide, arranged so that both basal lobes were in lateral view, and covered with a piece of glass coverslip. They were examined with a monocular microscope using $\frac{1}{6}$ in. objective.

When required, scale drawings were made with the aid of a squared eyepiece micrometer.

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[1] It is recommended that in specimens where the basal lobes are to be examined in lateral view, one lobe should be left attached to the coxite so that it may readily be determined which is the inner and which the outer lateral view.

(*d*) Variation of larval environment

Only one factor was varied in the larval environment in any one series of experiments.

An arbitrary " standard " series was reared as already described, in a tap-water medium at 25°–28° C. (Series B).

The following series were reared similarly but the temperature was varied :

15°–16° C. (Series F).
19°–22° C. (Series C).
30°–32° C. (Series E).

After preliminary experiments it was found that larvae could be reared satisfactorily in a medium containing $\frac{1}{3}$ sea-water. Series D was reared in $\frac{1}{3}$ sea-water at 25°–28° C.

Specimens of Naduruloulou stock (Series H) were reared similarly to Series B.

Attempts to rear larvae at 10° C., and at temperatures above 32° C. were unsuccessful.

The following summarizes the particulars for each series :

Series B. 25°–28° C.

About 40 batches representing nine generations were reared. Many of these were for the purpose of maintaining the stock, but 1,394 specimens (658 ♂♂, 736 ♀♀) were pinned from 19 batches, either mass rearings or individual egg batches. Specimens representing nine of these batches were studied ; they had been reared from December, 1949, to July, 1950. The 152 males examined came from six batches (1st generation mass rearing, 54 ; 3rd generation individual batches, 9, 9 ; 4th generation individual batches, 36, 14, 30). From the same batches respectively (excluding one 3rd generation batch) females were taken in the following numbers, 20, 10, 10, 10, 10 ; and in addition from a 3rd generation mass rearing (20) and 5th and 6th generation individual rearings (10, 10), making a total of 100, from eight batches. The mean temperature reading for the larval medium for one of these batches was 27·4° C. (6 readings). Genitalia of 25 males were dissected.

Series F. 15°–16° C.

One batch was reared in February-March, 1951, 350 specimens pinned (202 ♂♂, 148 ♀♀) and 100 of each sex examined. The batch was 9th generation (from Series C eggs, laid by females of 2nd generation bred at 19°–22° C.). Mean temperature was 15·2° C. (30 readings).

Genitalia of 25 males were dissected.

Series C. 19°–22° C.

Six batches were reared from February, 1950, to March, 1951, 500 specimens pinned (250 ♂♂, 250 ♀♀) and 100 of each sex examined. The first three batches (50, 50, 100 pinned adults) were from eggs from Series B (1st, 4th and 7th generations respectively). From the third of these, three succeeding generations at 19°–22° C were bred (100 adults pinned from each). Twenty per cent of each lot of pinned specimens was examined, the sexes being equally divided.

The following are the mean temperatures of the medium for each batch, with the number of readings in parenthesis: 20·5 C. (8), 20·3 C. (9), 21·3° C. (3), 20·5° C. (19), 20·7° C. (19), 20·5° C. (10).

Gemitalia of 25 males were dissected.

Series E. 30°–32° C.

Four batches were reared from December, 1950, to March, 1951, 469 specimens pinned (lots of 60, 88, 300 and 21 totalling 260 ♂♂, 199 ♀♀), and 100 of each sex examined. From the above batches respectively were taken 35, 30, 21 and 14 males and 18, 28, 48 and 6 females. The first two batches were 8th generation eggs from Series B; the third, 9th generation eggs from Series C (laid by female of 2nd generation bred at 19°–22° C.); the fourth, the progeny of the third. Mean temperatures of the medium for each batch (number of readings in parenthesis) were 31·1° C. (12), 30·7° C. (22), 30·6° C. (23), 29·9° C. (8).

Genitalia of 25 males were dissected.

Series D, 25°–28° C., ⅓ sea-water.

Five batches were reared from June to November, 1950, in a medium of ⅓ sea-water at 25°–28° C., 500 specimens pinned (250 ♂♂, 250 ♀♀) and 100 of each sex examined. The first batch was 6th generation eggs from Series B and the remainder were succeeding generations bred from these; from each 100 adults were pinned, 20% of which were examined, the sexes being equally divided. For two batches the mean temperatures (number of readings in parenthesis) were 27·1° C. (4), 25·9° C. (9).

The following are the salinity measurements at the beginning and end of each rearing:

Initial salinity. (‰)	Number of days.	Final salinity. (‰)
11·7	23	16·2
11·9	15	13·1
12·1	13	12·7
11·9	13	—
11·7	15	15·0

The sea-water used was the laboratory stock from Lowestoft; its salinity, measured on one occasion, was 34·6‰.

Genitalia of 25 males were dissected.

Series H. 25°–28° C.

One batch, the 2nd (Cambridge) generation of the Naduruloulou stock, was reared for study in April-May, 1951, 97 adults pinned (47 ♂♂, 50 ♀♀) and 25 of each sex examined. Two temperature readings of the medium were 27° C.

Genitalia of 10 males were dissected.

TABLE III.—*Aedes pseudoscutellaris*

Length (38 *units* = 1 *mm.*)

Wing	Number of specimens	Length of wing*																		
		80–82	83–85	86–88	89–91	92–94	95–97	98–100	101–103	104–106	107–109	110–112	113–115	116–118	119–121	122–124	125–127	128–130	131–133	134–136
Males																				
Series F, 15°–16° C.	100	—	—	—	—	—	—	2	3	22	52	19	2	—	—	—	—	—	—	—
Series C, 19°–22° C.	100	—	—	—	—	4	6	27	37	22	4	—	—	—	—	—	—	—	—	—
Series B, 25°–28° C.	150	—	—	1	15	36	40	8	—	—	—	—	—	—	—	—	—	—	—	—
Series E, 30°–32° C.	100	8	23	24	22	18	5	—	—	—	—	—	—	—	—	—	—	—	—	—
Series D, 25°–28° C., ⅓ sea-water	100	1	8	19	28	24	19	1	—	—	—	—	—	—	—	—	—	—	—	—
Series H, 25°–28° C., different stock	25	—	—	—	—	24	68	8	—	—	—	—	—	—	—	—	—	—	—	—
Females																				
Series F, 15°–16° C.	100	—	—	—	—	—	—	—	—	—	—	1	—	1	6	18	31	30	9	4
Series C, 19°–22° C.	100	—	—	—	—	—	—	—	—	—	—	—	2	7	17	33	22	14	5	—
Series B, 25°–28° C.	100	—	—	—	—	—	—	—	—	2	—	11	31	35	20	1	—	—	—	—
Series E, 30°–32° C.	100	—	—	—	—	4	16	19	28	26	4	3	—	—	—	—	—	—	—	—
Series D, 25°–28° C., ⅓ sea-water	100	—	—	—	—	—	—	—	8	20	18	30	18	5	1	—	—	—	—	—
Series H, 25°–28° C., different stock	25	—	—	—	—	—	—	—	—	—	4	32	56	8	—	—	—	—	—	—

* Numbers of specimens expressed in percentages.

(4) *Results*

(*a*) Tables III and IV : Length of wing and of hind femur

TABLE IV.—*Aedes pseudoscutellaris*

Hind femur *Length* (38 *units* = 1 *mm.*)

	Number of specimens	Length of femur.*													
		48–50	51–53	54–56	57–59	60–62	63–65	66–68	69–71	72–74	75–77	78–80	81–83	84–86	87–89
Males															
Series F. 15°–16° C.	100	—	—	—	—	—	1	21	56	20	2	—	—	—	—
Series C, 19°–22° C.	100	—	—	—	2	7	12	52	19	8	—	—	—	—	—
Series B, 25°–28° C.	152	—	—	—	2	24	49	25	—	—	—	—	—	—	—
Series E, 30°–32° C.	100	7	11	26	20	25	9	2	—	—	—	—	—	—	—
Series D, 25°–28° C., ⅓ seawater	100	—	—	2	22	49	21	6	—	—	—	—	—	—	—
Series H, 25°–28° C., different stock	25	—	—	—	—	12	48	40	—	—	—	—	—	—	—
Females															
Series F, 15°–16° C.	100	—	—	—	—	—	—	—	4	10	29	39	16	2	—
Series C, 19°–22° C.	100	—	—	—	—	—	—	—	2	13	23	38	21	1	2
Series B, 25°–28° C.	100	—	—	—	—	—	3	6	21	42	24	4	—	—	—
Series E, 30°–32° C.	100	2	3	5	12	32	25	16	5	—	—	—	—	—	—
Series D, 25°–28° C., ⅓ sea-water	100	—	—	—	—	7	12	37	29	14	1	—	—	—	—
Series H, 25°–28° C., different stock	25	—	—	—	—	—	—	—	16	76	8	—	—	—	—

* Numbers of specimens expressed in percentages.

The measurements have not been converted from the units in which they were made, since tabulation of these shows clearly the effects of different larval conditions.

Wing-length was measured from the large sclerite at the base[1] to the tip of the wing, excluding the fringe. The table shows that the longest wings are found in specimens bred at lowest temperatures, and conversely the shortest in those bred at the highest temperatures, with a gradient between. The wings of both males and females reared in ⅓ sea-water (Series D) are significantly shorter (at 0·1% level) than those reared in tap-water at the same temperature (Series B). Wings of females are longer than those of males in the same series.

The length of the hind femur was measured from its upper basal margin to the tip of the white patch at the apex. It shows a similar gradation to the wing-length in relation to temperature except that this is not apparent between females bred at 15°–16° C. and 19°–22° C. In Series D from ⅓ sea-water the femur is shorter than in Series B from tap-water; the difference is highly significant. The femur is longer in females than in males from the same series.

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[1] At the wing base there is a complicated system of small sclerites ; the largest of these is a prominent dark shield-shaped sclerite lying just posterior to the base of the costa and articulating distally with the remigium (the united bases of veins of the radial complex). Prashad (1918) in his description of the wing-joint in Anophelines calls it the " epaulette " ; S. R. Christophers (personal communication) regards it as homologous with the 2nd axillary of Snodgrass (1935). It was found convenient to measure the wing-length from the proximal edge of the well-defined sclerite, rather than from the actual base of the costa which was not always easy to observe. The difference between measurements taken from these two points is less than 2% of the total wing-length and therefore of negligible importance in comparisons between species.

The ratio of the length of the wing to that of the hind femur was plotted for several series. This showed some correlation but there was considerable scatter of the points, so that one could not be deduced from the other with any precision.

(*b*) Table V: Pale scales under the proboscis

TABLE V.—*Aedes pseudoscutellaris*

Proboscis	Number of specimens	*Pale streak on under side* Number of pale scales*							
		0	1–10	11–20	21–30	31–40	41–50	51–60	61–70
Males									
Series F, 15°–16° C.	100	64	25	8	3	—	—	—	—
Series C, 19°–22° C.	100	32	52	13	3	—	—	—	—
Series B, 25°–28° C.	152	20	43	30	6	1	—	—	—
Series E, 30°–32° C.	100	16	48	20	13	3	—	—	—
Series D, 25°–28° C., ⅓ sea-water	100	17	69	13	1	—	—	—	—
Series H, 25°–28° C., different stock	25	—	8	12	16	36	12	8	8
Females									
Series F, 15°–16° C.	100	93	7	—	—	—	—	—	—
Series C, 19°–22° C.	100	67	28	5	—	—	—	—	—
Series B, 25°–28° C.	100	58	31	6	4	1	—	—	—
Series E, 30°–32° C.	100	64	31	5	—	—	—	—	—
Series D, 25°–28° C., ⅓ sea-water	100	66	31	3	—	—	—	—	—
Series H, 25°–28° C., different stock	25	—	—	24	12	24	20	16	4

* Numbers of specimens expressed in percentages.

The amount of pale scaling under the proboscis was recorded by an actual count of the number of pale scales. These observations led to the conclusion that a count of more than ten could be taken to represent the presence of a pale streak under the proboscis.

Ignoring for the moment the implications of the counts for Series H, the table illustrates that a pale streak is of much more frequent occurrence in males than in females. The variation of larval environment has had little effect on the amount of pale scaling in the female, except at the lowest temperature, 15°–16°, when a much higher proportion have the proboscis completely dark. This applies also to males at 15°–16° C., and there is a progressive reduction in the number of males with a recognizable streak at temperatures below 25°–28° C., but not an appreciable increase above. Series D in ⅓ sea-water also shows a reduction in numbers with a streak.

Series H, from different stock, has a very high proportion of both sexes with a streak. This emphasizes that though the observations of variation in one stock may suggest certain conclusions, it would be unsafe to interpret them as applying rigidly to all members of the species, let alone to related species.

(*c*) Table VI : Scutal pattern

TABLE VI.—*Aedes pseudoscutellaris*

Scutum	Number of specimens	*Extent of white scaling on anterolateral margin* Scutal pattern * (see Fig. 19). B –	B	A –	A	A +
Males						
Series F, 15°–16° C.	100	65	30	4	1	—
Series C, 19°–22° C.	100	11	35	43	11	—
Series B, 25°–28° C.	151	—	4	14	82	—
Series E, 30°–32° C.	100	1	4	29	46	20
Series D, 25°–28° C., ⅓ sea-water	100	—	1	28	65	6
Series H, 25°–28° C., different stock	25	—	12	40	40	8
Females						
Series F, 15°–16° C.	100	69	29	2	—	—
Series C, 19°–22° C.	100	11	61	24	4	—
Series B, 25°–28° C.	100	5	16	59	20	—
Series E, 30°–32° C.	100	1	32	32	30	5
Series D, 25°–28° C., ⅓ sea-water	100	1	18	55	25	—
Series H, 25°–28° C., different stock	25	—	20	52	28	—

* Numbers of specimens expressed in percentages.

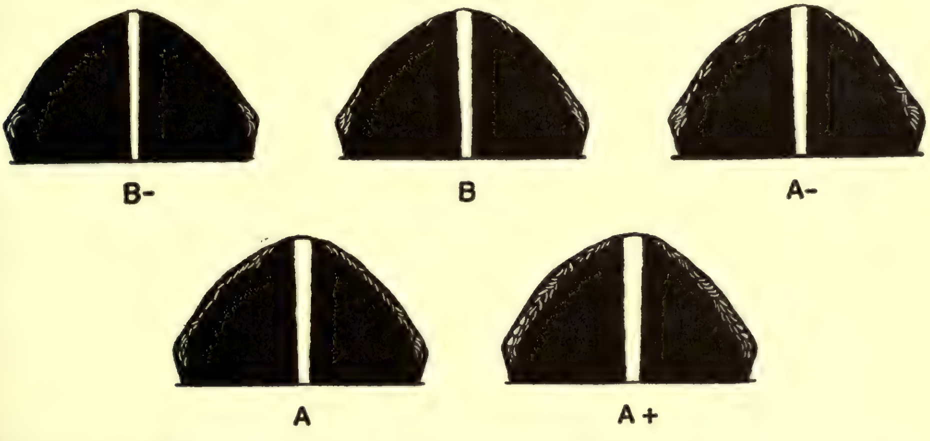

FIG. 19. Variation in white scaling on anterolateral margin of scutum of *Aedes pseudoscutellaris* (Theobald). (B –, F. 268 ; B, C. 44 ; A –, C. 152 ; A, D. 488 ; A +, E. 123 ; all ♀♀.)

The line of white scales along the anterolateral margin of the scutum distinguishes *pseudoscutellaris* from the closely similar species *polynesiensis*. The line may be definite, or faint and interrupted, but there are always some pale scales present.

For biometrical interpretation the amount of white scaling was divided into five categories, B –, B, A –, A, and A +, B – having the least and A + the greatest development of white scales. These categories are illustrated from typical specimens in Fig. 19.

B— : white scales confined to a small patch on the scutal angle.

B : white scales on the scutal angle and extending forward slightly along the margin ; or else only on the scutal angle, with 2 or 3 scales further forward.

A— : white scales extending along the anterolateral margin, but the line interrupted to a greater or lesser extent, sometimes complete on one side and incomplete on the other.

A : white scales forming a narrow continuous line along the anterolateral margin.

A+ : white line on anterolateral margin quite thick and well marked.

There is no line of demarcation between these categories and interpretation is purely a matter of judgment, but by allotting the specimens among them, they do present a general picture of the variation in this character.

From the table it appears that at 15° C. the amount of white scaling is reduced to a minimum and the pattern is similar in both sexes ; with increase of temperature the white scaling increases, but to a greater extent in males than in females ; a larval environment of ⅓ sea-water does not appreciably affect it.

The presence of white scales on the anterolateral margin of the scutum is the only character known to distinguish females of *pseudoscutellaris* from *polynesiensis*. Specimens of the latter occasionally have 1–3 pale scales on the scutal angle. A count of the number of white scales on the scutal angle in specimens of *pseudoscutellaris* recorded as B— from all series, (165 out of a total of 1,101 examined) gave a range of 1–13 with a mean of approximately 6 scales for 299 scutal angles (one side of a specimen was sometimes rubbed or obscured).

(*d*) Table VII : White scales on either side of the prescutellar bare area

TABLE VII.—*Aedes pseudoscutellaris*

Scutum	Number of specimens	*White scales on either side of prescutellar bare area* Total number of white scales on both sides.*				
		0	1–4	5–8	9–12	13 or over
Males						
Series F, 15°–16° C.	100	31	54	14	1	—
Series C, 19°–22° C.	100	27	55	15	3	—
Series B, 25°–28° C.	135	6	61	27	6	—
Series E, 30°–32° C.	100	26	55	15	3	1
Series D, 25°–28° C., ⅓ sea-water	100	18	54	23	3	2
Series H, 25°–28° C., different stock	25	8	88	4	—	—
Females						
Series F, 15°–16° C.	100	50	39	10	1	—
Series C, 19°–22° C.	100	61	33	5	1	—
Series B, 25°–28° C.	100	41	42	13	3	1
Series E, 30°–32° C.	100	60	37	3	—	—
Series D, 25°–28° C., ⅓ sea-water	100	52	42	5	1	—
Series H, 25°–28° C., different stock	21	76	24	—	—	—

* Numbers of specimens expressed in percentages.

In certain species the white median line on the scutum divides into a definite fork on either side of the prescutellar bare area. In recording this character an actual count of the total number of white scales on both sides of the prescutellar bare area was made, and from these observations it was concluded that a count of more than eight represented a more or less complete fork.

The table shows comparatively little variation in this character and nothing that could be safely correlated with variation in larval environment. Only a very small percentage of specimens show a tendency to form a complete fork ; males, however, do have a few more white scales than females.

The evidence suggests that this character is less subject to variation than some others concerned in scale pattern.

(*e*) Table VIII : White basal patches on fore and mid tarsi

TABLE VIII.—*Aedes pseudoscutellaris*

Fore and mid tarsi		*White basal patches* *Some white scales at base of one or both segments*									
		Fore tarsus					Mid tarsus				
	Number of specimens	I	II	III	IV	V	I	II	III	IV	V
Males											
Series F, 15°–16° C.	100	100	100	—	—	—	100	98	—	—	—
Series C, 19°–22° C.	100	100	100	1	—	—	100	99	—	—	—
Series B, 25°–28° C.	151	100	100	1	—	—	100	97	3	—	—
Series E, 30°–32° C.	100	100	100	1	—	—	100	100	1	—	—
Series D, 25°–28° C., ⅓ sea-water	100	100	100	1	—	—	100	99	—	—	—
Series H, 25°–28° C., different stock	25	100	100	—	—	—	100	100	—	—	—
Females											
Series F, 15°–16° C.	100	100	100	20	—	—	100	100	—	—	—
Series C, 19°–22° C.	100	100	100	12	—	—	100	100	—	—	—
Series B, 25°–28° C.	100	100	100	58	—	—	100	100	4	—	—
Series E, 30°–32° C.	100	100	100	92	1	23	100	100	21	—	—
Series D, 25°–28° C., ⅓ sea-water	100	100	100	66	3	13	100	100	11	—	—
Series H, 25°–28° C., different stock	25	100	100	72	4	8	100	100	16	—	—

* Numbers of specimens expressed in percentages.

One or more white scales at the base of a segment were interpreted as a white patch. Usually both tarsi of the pair were examined and a patch was recorded if there were white scales on one or both.

The table shows that *pseudoscutellaris* normally has white patches at the base of fore and mid tarsal segments I and II ; the male seldom has more and in these characters is less subject to variation than is the female.

Females frequently have a white patch at the base of fore tarsal III and though there is no positive correlation with temperature at 15°–16° C. and 19°–22° C., there is a marked increase in the number with this character at 25°–28° C. and again at 30°–32° C.; larval environment of ⅓ sea-water does not produce any notable effect. At 30°–32° C. and in ⅓ sea-water an occasional specimen has a patch on IV, and a higher proportion show one on V. The different stock of Series H show these characters at 25°–28° C. Below 25°–28° C. patches are absent from mid tarsal III ; at this temperature few specimens show them, but there is a marked increase at 30°–32° C. and a lesser one in ⅓ sea-water ; Series H again resembles the latter two series.

The more frequent occurrence of white patches on the fore tarsal segments than on the mid is rather unusual amongst mosquitoes and does not appear to have been observed in other members of the *scutellaris* subgroup. The usual tendency is for the amount of white scaling to be least on the fore tarsus, somewhat more extensive on the mid tarsus, and greatest on the hind tarsus.

(*f*) Tables IX and X : Extent of white anterior streak and ventral dark line on the hind femur

TABLE IX.—*Aedes pseudoscutellaris*

Hind femur		*Length of anterior white streak*				
		Ratio of length of streak to total length of femur.*				
	Number of specimens	0·75–0·80	0·80–0·85	0·85–0·90	0–90–0·95	0–95–1·00
Males						
Series F, 15°–16° C.	100	—	32	67	1	—
Series C, 19°–22° C.	100	2	30	68	—	—
Series B, 25°–28° C.	152	—	16	84	—	—
Series E, 30°–32° C.	100	—	29	70	1	—
Series D, 25°–28° C., ⅓ sea-water	100	—	12	84	3	1
Series H, 25°–28° C., different stock	25	—	44	56	—	—
Females						
Series F, 15°–16° C.	100	—	58	42	—	—
Series C, 19°–22° C.	100	1	37	62	—	—
Series B, 25°–28° C.	100	—	49	51	—	—
Series E, 30°–32° C.	100	2	44	54	—	—
Series D, 25°–28° C., ⅓ sea-water	100	1	30	69	—	—
Series H, 25°–28° C., different stock	25	—	44	56	—	—

* Numbers of specimens expressed in percentages.

The hind femur at its base joins the trochanter, which projects ventrally a short distance taken from the base of the femur. All measurements taken from the base of the femur were taken towards the dorsal side ; if taken from beneath they would have been slightly shorter.

The length of the white anterior streak has not been used taxonomically, nor is it likely to be of value in that respect since many species have it apparently equally developed. However, the opportunity was taken to investigate whether this character varies in the same way as other characters of white scaling. Table IX shows no apparent correlation between the length of the streak and the conditions in which larvae of the different series were reared.

TABLE X.—*Aedes pseudoscutellaris*

Hind femur	Number of specimens	*Distance from base of femur to beginning of dark ventral scaling* Ratio of distance to total length of femur.*				
		0	0·01–0·10	0·10–0·20	0·20–0·30	0·30–0·40
Males						
Series F, 15°–16° C.	100	18	—	44	34	4
Series C, 19°–22° C.	100	25	2	48	25	—
Series B, 25°–28° C.	152	12	1	18	48	21
Series E, 30°–32° C.	100	3	—	14	65	18
Series D, 25°–28° C., ⅓ sea-water	99	13	1	19	59	8
Series H, 25–°28°c., different stock	25	4	—	8	76	12
Females						
Series F, 15°–16° C.	100	34	3	39	22	2
Series C, 19°–22° C.	100	31	2	32	35	—
Series B, 25°–28° C.	100	19	4	28	43	6
Series E, 30°–32° C.	100	7	—	25	56	12
Series D, 25°–28° C., ⅓ sea-water	100	6	1	29	55	9
Series H, 25°–28° C., different stock	25	—	—	12	72	16

* Numbers of specimens expressed in percentages.

A possible difference was observed between *pseudoscutellaris* and *polynesiensis* in the extent of the dark ventral scaling on the hind femur. The amount of variation in this character in *pseudoscutellaris* was therefore investigated. The measurement was made from the base of the femur, as above, to the beginning of the dark scaling. If a line of dark scales reached right to the base ventrally, it was counted as zero, though owing to the trochantal projection, the micrometer reading was a small number. This explains the low frequency in the 0·01–0·10 ratio in Table X, as compared with that in Groups 0 and 0·10–0·20. This fault was not serious from a point of view of comparison with other species. Table X shows that this character follows the general trends already shown for others. The amount of dark scaling is greatest at low temperatures and following a gradient, becomes least at 30°–32° (though this gradation is not found between males at 15° C. and 19°–22° C.) ; ⅓ sea-water apparently does not affect it.

It may be added here that of 33 specimens of *polynesiensis* from various localities examined for this character 3 fell in the category 0·20–0·30, 9 in 0·30–0·40, 20 in 0·40–0·50, and 1 in 0·50–0·60. This suggests a difference between the two species, but it may be a geographically variable character ; insufficient specimens of *polynesiensis* from Fiji were examined to indicate whether it would be a useful character there.

(*g*) Tables XI–XVIII : The bands on the hind tarsal segments

Each band was measured at its greatest length, i.e., from the base to the further extremity of the white scales ; the bands were longest on the upper anterior (outer) surface of the segments.

The band on hind tarsal segment I was always interrupted by a dark line beneath. The bands on II–IV were measured also at their least length, i.e., from the base of the segment to the nearest dark scaling which was continuous to the apex. Sometimes a band was slightly interrupted by dark scales at its base but formed a continuous ring distal to these ; such interruptions were ignored. In other words, the measurements of least length are of the difference between the greatest extent of continuous dark scaling and the total length of the segment. Bands were narrowest on the lower posterior (inner) surface of the segment.

A continuous line of dark scales beneath, even if only one scale in width was regarded as a complete interruption ; sometimes these scales were greyish rather than black, but contrasted with the white.

Table XI : White band on hind tarsal segment I

TABLE XI.—*Aedes pseudoscutellaris*

Hind tarsal, Segment I	Number of specimens	*Greatest length of white band* Ratio of white band to total length of segment.* 0·15–0·20	0·20–0·25	0·25–0·30	0·30–0·35	0·35–0·40
Males						
Series F, 15°–16° C.	100	7	82	11	—	—
Series C, 19°–22° C.	100	3	72	25	—	—
Series B, 25°–28° C.	151	—	13	85	2	—
Series E, 30°–32° C.	100	—	3	71	25	1
Series D, 25°–28° C., ⅓ sea-water	100	—	15	75	10	—
Series H, 25°–28° C., different stock	25	—	—	72	28	—
Females						
Series F, 15°–16° C.	100	3	82	14	1	—
Series C, 19°–22° C.	100	—	73	27	—	—
Series B, 25°–28° C.	100	—	11	79	10	—
Series E, 30°–32° C.	100	—	1	57	39	3
Series D, 25°–28° C., ⅓ sea-water	100	—	6	80	14	—
Series H, 25°–28° C., different stock	25	—	—	84	16	—

* Numbers of specimens expressed in percentages.

The length of the band varies in relation to the temperature gradient, being least at 15°–16° C., and greatest at 30°–32° C. It is apparently not affected by a larval environment of ⅓ sea-water. Females from the different stock, Series H, do not differ from others reared at 25°–28° C., but the males resemble those reared at 30°–32° C. The length of the band varies little between males and females of the same series.

Tables XII and XIII: White band on hind tarsal segment II

TABLE XII.—*Aedes pseudoscutellaris*

Hind tarsal, Segment II	Number of specimens	*Greatest length of white band* Ratio of white band to total length of segment.*				
		0·20–0·25	0·25–0·30	0·30–0·35	0·35–0·40	0·40–0·45
Males						
Series F, 15°–16° C.	100	4	81	15	—	—
Series C, 19°–22° C.	100	4	60	34	2	—
Series B, 25°–28° C.	152	1	15	62	22	—
Series E, 30°–32° C.	100	—	5	53	40	2
Series D, 25°–28° C., ⅓ sea-water	100	—	8	66	26	—
Series H, 25°–28° C., different stock	25	—	—	72	28	—
Females						
Series F 15°–16°c.	100	2	82	15	1	—
Series C, 19°–22° C.	100	3	50	46	1	—
Series B, 25°–28° C.	100	—	9	60	31	—
Series E 30°–32° C.	100	—	—	23	71	6
Series D, 25°–28° C., ⅓ sea-water	100	—	1	47	51	1
Series H, 25°–28° C., different stock	25	—	4	68	28	—

* Numbers of specimens expressed in percentages.

TABLE XIII.—*Aedes pseudoscutellaris*

Hind tarsal, Segment II	Number of specimens	*Least length of white band* Ratio of white band to total length of segment*						
		0	0·01–0·05	0·05–0·10	0·10–0·15	0·15–0·20	0·20–0·25	0·25–0·30
Males								
Series F, 15°–16° C.	100	76	1	10	13	—	—	—
Series C, 19°–22° C.	100	30	1	5	28	34	2	—
Series B, 25°–28° C.	150	1	—	1	9	49	35	5
Series E, 30°–32° C.	100	2	—	—	2	41	46	9
Series D, 25°–28° C., ⅓ sea-water	100	2	—	—	10	52	34	2
Series H, 25°–28° C., different stock	25	—	—	—	—	44	56	—
Females								
Series F, 15°–16° C.	100	78	4	2	12	4	—	—
Series C, 19°–22° C.	100	20	1	3	31	40	5	—
Series B, 25°–28° C.	100	—	—	—	5	41	49	5
Series E, 30°–32° C.	100	—	—	—	1	20	53	26
Series D, 25°–28° C., ⅓ sea-water	100	—	—	—	—	35	57	8
Series H, 25°–28° C., different stock	25	—	—	—	—	36	64	—

* Numbers of specimens expressed in percentages.

The band, both in its greatest and in its least length, follows the temperature gradient; the amount of white scaling increases from 15°–16° C. up to 30°–32° C.

Considering the greatest length of the band, males appear unaffected by ⅓ sea-water but females show a slight increase in white scaling.

Females reared at 30°–32° C. and in ⅓ sea-water in both measurements show more white scaling than males of the same series.[1]

In regard to the least length of the band the most noteworthy effect of the varied conditions is the appearance at low temperatures of a high proportion of specimens with the band completely interrupted by dark scales. Females from ⅓ sea-water show a slight increase in the white scaling but males are not affected. The different stock of Series H also has slightly more white scaling.

Tables XIV and XV : White band on hind tarsal segment III

TABLE XIV.—*Aedes pseudoscutellaris*

Hind tarsal, Segment III — *Greatest length of white band*

Ratio of white band to total length of segment*

	Number of specimens	0·30–0·35	0·35–0·40	0·40–0·45	0·45–0·50	0·50–0·55	0·55–0·60	0·60–0·65	0·65–0·70
Males									
Series F, 15°–16° C.	100	2	55	36	7	—	—	—	—
Series C, 19°–22° C.	100	—	13	61	26	—	—	—	—
Series B, 25°–28° C.	152	—	2	43	49	5	1	—	—
Series E, 30°–32° C.	100	—	—	8	50	30	12	—	—
Series D, 25°–28° C., ⅓ sea-water	100	—	—	19	64	13	4	—	—
Series H, 25°–28° C., different stock	25	—	—	16	68	16	—	—	—
Females									
Series F, 15°–16° C.	100	1	46	49	4	—	—	—	—
Series C, 19°–22° C.	100	—	6	48	46	—	—	—	—
Series B, 25°–28° C.	100	—	—	5	72	19	4	—	—
Series E, 30°–32° C.	100	—	—	1	23	39	30	6	1
Series D, 25°–28° C., ⅓ sea-water	100	—	—	2	39	30	18	2	—
Series H, 25°–28° C., different stock	25	—	—	4	72	20	4	—	—

* Numbers of specimens expressed in percentages.

The bands show the same correlation with temperature as do those on Segments I and II. Both males and females from ⅓ sea-water show an increase in the greatest length of the band ; the females do so in the least length also but it is not affected in the males. Males of different stock (Series H) have slightly longer bands, but not the females ; neither differ much in the least length from the original stock. In all series the females have slightly longer bands than the males and less extensive dark scaling beneath. At 15°–16° C. a high proportion of both sexes have the white band completely interrupted.

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[1] This effect is no doubt partly due to the fact that, as many females emerge later than the males, their immature stages have had longer in the abnormal conditions. It was observed that in a proportion of specimens from these two series the tarsal segments did not become fully extended after emergence ; grossly abnormal specimens were not used for measurements, but in others this had probably occurred to a less marked degree.

TABLE XV.—*Aedes pseudoscutellaris*

Hind tarsal, Segment III — *Least length of white band*

	Number of specimens	Ratio of white band to total length of segment*							
		0	0·01–0·10	0·10–0·20	0·20–0·30	0·30–0·40	0·40–0·50	0·50–0·60	0·60–0·70
Males									
Series F, 15°–16° C.	100	66	3	21	10	—	—	—	—
Series C, 19°–22° C.	100	12	1	14	50	23	—	—	—
Series B, 25°–28° C.	152	—	—	—	11	87	2	—	—
Series E, 30°–32° C.	100	—	—	—	3	65	32	—	—
Series D, 25°–28° C., ½ sea-water	100	—	—	1	14	81	4	—	—
Series H, 25°–28° C., different stock	25	—	—	—	12	84	4	—	—
Females									
Series F, 15°–16° C.	100	48	4	25	23	—	—	—	—
Series C, 19°–22° C.	100	3	—	8	40	49	—	—	—
Series B, 25°–28° C.	100	—	—	—	1	85	14	—	—
Series E, 30°–32° C.	100	—	—	—	—	30	67	2	1
Series D, 25°–28° C., ½ sea-water	100	—	—	—	2	58	40	—	—
Series H, 25°–28° C., different stock	25	—	—	—	4	92	4	—	—

* Numbers of specimens expressed in percentages.

Tables XVI and XVII.: White band on hind tarsal segment IV

TABLE XVI.—*Aedes pseudoscutellaris*

Hind tarsal, Segment IV — *Greatest length of white band*

	Number of specimens	Ratio of white band to total length of segment*							
		0·50–0·55	0·55–0·60	0·60–0·65	0·65–0·70	0·70–0·75	0·75–0·80	0·80–0·85	0·85–0·90
Males									
Series F, 15°–16° C.	100	2	12	64	21	1	—	—	—
Series C, 19°–22° C.	100	—	5	33	48	13	1	—	—
Series B, 25°–28° C.	152	—	3	16	51	29	1	—	—
Series E, 30°–32° C.	100	—	—	1	15	57	24	2	1
Series D, 25°–28° C., ½ sea-water	100	—	—	2	20	52	24	1	1
Series H, 25°–28° C., different stock	25	—	—	4	56	36	4	—	—
Females									
Series F, 15°–16°c.	100	—	13	40	40	7	—	—	—
Series C, 19°–22° C.	100	—	1	14	65	19	1	—	—
Series B, 25°–28° C.	100	—	—	3	31	51	15	—	—
Series E, 30°–32° C.	100	—	—	1	4	36	48	9	2
Series D, 25°–28° C., ½ sea-water	100	—	—	—	5	44	44	6	1
Series H, 25°–28° C., different stock	25	—	—	—	28	56	16	—	—

* Numbers of specimens expressed in percentages.

TABLE XVII.—*Aedes pseudoscutellaris*

Hind tarsal, Segment IV		*Least length of white band*								
		Ratio of white band to total length of segment								
	Number of specimens	0	0·01–0·10	0·10–0·20	0·20–0·30	0·30–0·40	0·40–0·50	0·50–0·60	0·60–0·70	0·70–0·80
Males										
Series F, 15°–16° C.	100	75	1	7	13	3	1	—	—	—
Series C, 19°–22° C.	100	6	—	5	6	18	44	21	—	—
Series B, 25°–28° C.	152	—	—	—	—	2	22	65	11	—
Series E, 30°–32° C.	100	—	—	—	—	1	—	60	39	—
Series D, 25°–28° C., ½ sea-water	100	—	—	—	—	2	17	73	8	—
Series H, 25°–28° C., different stock	25	—	—	—	—	—	40	60	—	—
Females										
Series F, 15°–16° C.	100	50	1	5	14	16	14	—	—	—
Series C, 19°–22° C.	100	1	—	—	2	5	43	48	1	—
Series B, 25°–28° C.	100	—	—	—	—	—	5	61	34	—
Series E, 30°–32° C.	100	—	—	—	—	1	—	21	72	6
Series D, 25°–28° C., ½ sea-water	100	—	—	—	—	—	3	39	58	—
Series H, 25°–28° C., different Stock	25	—	—	—	—	—	24	52	24	—

* Numbers of specimens expressed in percentages.

The greatest and least length of the band is affected by temperature similarly to the bands of the preceding segments. Specimens reared in ½ sea-water show some increase in white scaling, though this is not very marked in the least length of the band of the males. Series H is not greatly different from the original stock. The bands are longer, by both measurements, in females than in males of the same series. A high proportion of specimens reared at 15°–16° C. have the bands completely interrupted.

In *pseudoscutellaris* this segment is all white above, but occasionally has one or two dark scales at the base on its under side; these seldom form any obvious interruption to the white scaling. Their presence was noted, and if they extended an appreciable distance along the segment, an estimate of this was made but no exact measurement.

The table records the percentages of specimens in which dark scales were present and also the percentage (of the total number of specimens) in which there was an observable interruption to the white scaling by a dark line beneath. The length of the dark line was measured from the base of the segment; occasional dark scales at the tip were ignored. The categories are unequal and, except for total interruption, approximate.

Above 22° C. there is no great difference between the series though females at 25°–28° C. tend to have dark scales more often than those at 30°–32° C. or in ½ sea-water; males from Series H have them more often than those of the original stock, but females do not differ. However, none of these series show any appreciable interruption by dark scales.

Table XVIII : Dark scaling on hind tarsal segment V

TABLE XVIII.—*Aedes pseudoscutellaris*

Hind tarsal, Segment V — *Amount of dark scaling beneath*

	Number of specimens	Dark scales*		Ratio of dark line to total length of segment*		
		Absent	Present	0·25–0·50	0·50–0·99	1·00
Males						
Series F, 15°–16° C.	100	4	96	51	12	12
Series C, 19°–22° C.	100	39	61	2	1	—
Series B, 25°–28° C.	152	99	1	—	—	—
Series E, 30°–32° C.	99	94	6	—	—	—
Series D, 25°–28° C., ½ sea-water	100	92	8	—	—	—
Series H, 25°–28° C., different stock	25	72	28	—	—	—
Females						
Series F, 15°–16° C.	100	10	90	20	3	2
Series C, 19°–22° C.	100	60	40	—	—	—
Series B, 25°–28° C.	100	89	11	—	—	—
Series E, 30°–32° C.	100	99	1	—	—	—
Series D, 25°–28° C., ½ sea-water	100	99	1	—	—	—
Series H, 25°–28° C., different stock	25	88	12	—	—	—

* Number of specimens expressed in percentages.

(*h*) Table XIX.—Distance between lateral patches on tergites V and VI

TABLE XIX.—*Aedes pseudoscutellaris*

Abdominal tergites V and VI — *Horizontal distance between lateral white patches*

	Tergite V			Tergite VI		
		Distance between patches*			Distance between patches*	
	Number of individuals	1–4 scales	5 or more scales	Number of individuals	1–4 scales	5 or more scales
Males						
Series F, 15°–16° C.	100	2	98	100	—	100
Series C, 19°–22° C.	100	2	98	100	2	98
Series B, 25°–28° C.	148	3	97	144	2	98
Series E, 30°–32° C.	100	8	92	100	8	92
Series D, 25°–28° C., ½ sea-water	100	4	96	100	3	97
Series H, 25°–28° C., different stock	25	9	91	25	12	88
Females						
Series F, 15°–16° C.	100	—	100	100	—	100
Series C, 19°–22° C.	100	—	100	100	—	100
Series B, 25°–28° C.	100	—	100	100	—	100
Series E, 30°–32° C.	100	1	99	100	3	97
Series D, 25°–28° C., ½ sea-water	100	—	100	100	2	98
Series H, 25°–28° C., different stock	25	—	100	25	4	96

* Numbers of specimens expressed in percentages.

At 19°–22° C. there is a marked increase in the number of specimens with dark scales and a few males have a measureable dark line; at 15°–16° few specimens are without dark scales and a notable proportion, particularly of males, have an incomplete dark line beneath, while in a few the interruption is complete.

Tergites V and VI were selected for the study of variation in abdominal markings as in all members of *scutellaris* subgroup the characteristic pattern of the species is most frequently found on one or both of these segments. In order to discover whether there was any tendency under different treatments for the lateral patches of *pseudoscutellaris* to extend and form a complete transverse band, the greatest horizontal distance between the lateral white scales was measured. Where the white scales were confined to continuous patches this is the distance between the patches, but in many cases beyond the tip of the continuous marking (i.e., towards the mid line) there were one or two isolated white scales.

Since the upper surface of the tergite is curved to a variable extent the measurement actually represents the chord of the arc, but the difference would be unimportant.

Measurements were made with a micrometer, 38 divisions of which equalled 1 mm. It was frequently observed that single scales measured in width approximately one of these divisions. The distances have therefore been expressed in the table as number of scales, in order that they may be easily interpretable. For evaluation of the results a distance of 4 or less was taken to represent a tendency to form a complete band (a condition comparable with the dotted bands of *riversi, horrescens* and *tongae*), but in no case was a complete band observed.

The table shows that there is very little tendency to form complete bands and this is scarcely affected by different treatments though there is some increase in white scaling at 30°–32° C., and males of all series show a little more white scaling than females; males of the different stock resemble those bred at 30°–32° C.

(*i*) Table XX: Specialized setae on the basal lobe

TABLE XX.—*Aedes pseudoscutellaris*

Basal lobe of coxite of male

Number of specialized setae

	Number of specimens	Number of lobes	Number of specialized setae*				
			2	3	4	5	6
Series F, 15°–16° C.	25	50	2	16	46	30	6
Series C, 19°–22° C.	25	50	—	20	54	24	2
Series B, 25°–28° C.	25	50	—	28	54	18	—
Series E, 30°–32° C.	25	50	2	22	52	20	4
Series D, 25°–28° C., ½ sea-water	25	50	2	14	50	26	8
Series H, 25°–28° C., different stock	10	20	—	35	60	5	—

* Number of lobes expressed in percentages.

The specialized setae on the basal lobe of the coxite are of particular interest as they are the most important character by which *pseudoscutellaris* is distinguished from *polynesiensis* (in which they are absent). Large variations in the number of these would cast considerable doubt on their value in identification and delimitation of species.

As already recounted, the basal lobe was mounted in lateral view (see Fig. 5). The specialized setae are broad and well defined, but at the distal end of the row there may be one or two more slender setae which appear slightly flattened and it is often difficult to decide whether these should be included in the count or not. In order to avoid as far as possible any differences between series due to different interpretations of such setae at different times, a slide of genitalia mounts (2 or 3 per slide) was examined from each series in turn.

The results are shown in Table XX. They have been examined statistically and the difference between the series are not significant.

It may be added that although no records were made, there appeared also to be very little variation in the arrangement of the non-specialized setae on the basal lobe. An occasional specimen has a scale amongst the setae towards the tip, but this is an aberration that occurs also in *polynesiensis* (see Fig. 7).

(5) *Summary of Experimental Results*

The following is a summary of the results obtained from a biometrical study of specimens of *Aedes pseudoscutellaris* reared under controlled conditions in which one factor of the larval environment was varied.

1. Size of adults decreases with increase in temperature or salinity of the larval environment.

2. In general, the amount of white scaling increases with rise in temperature; conversely the amount of dark scaling increases with fall in temperature. The reverse has not been observed but some characters are not affected.

3. Increase in temperature effects an increase in white scaling in the following positions: under side of proboscis; anterolateral margin of scutum; fore and mid tarsal segments III, fore tarsals IV–V, hind tarsals I–IV; abdominal tergites V and VI. Many of these characters follow a parallel gradient to the temperature; others are affected only at low or at high temperatures, or to different degrees in the two sexes. The dark ventral line on the hind femur increases in extent with decrease in temperature.

4. A larval environment of $\frac{1}{3}$ sea-water effects a decrease in white scaling under the proboscis of males; and an increase in white scaling on fore tarsal segments IV–V and hind tarsal II of females and on hind tarsals III–IV of both sexes. Other scale characters are apparently not affected.

5. The extent of white scaling on either side of the prescutellar bare area and the length of the anterior white streak on the hind femur do not appear to vary in relation to larval environment.

6. Males tend to have more white scaling on the under side of proboscis, anterolateral margin of scutum and lateral patches of abdominal tergites, than do females reared in the same conditions.

7. Females tend to have more white scaling on fore tarsal segments III–V, mid tarsal III and hind tarsals III–IV, than do males reared in the same conditions.

8. A white streak under the proboscis may be absent or variable in one stock and well developed in another stock of the same species.

9. The characteristic white scaling on the anterolateral margin of scutum is retained in varied environments.

10. Although the greatest lengths of white bands on the hind tarsi vary with larval environment, the total variation is insufficient to affect seriously their use as taxonomic characters.

11. Low temperatures may produce partial or complete interruption of the white bands on the hind tarsal segments.

12. The characteristic markings of the abdominal tergites are retained in varied environments.

13. The number of specialized setae on the basal lobe of the male coxite is not varied significantly by alteration of larval environment.

(6) *Conclusions*

It would be unsafe to regard the results of these studies on a small population as applicable to *pseudoscutellaris* as a whole, let alone to other species of the *scutellaris* subgroup. Nevertheless, they do support the specific status given to members of the *scutellaris* subgroup by showing that, although currently accepted diagnostic characters can be varied by environmental conditions, with few exceptions the range of variation is not of the same magnitude as the differences between species in the same character. They also show that these characters remain relatively constant through numerous generations. In particular, the lack of variation in the basal lobe of the male coxite is evidence of the value of this structure in defining species.

The experiments suggest that two characters should be used with some caution for delimiting species since *pseudoscutellaris* can exhibit both extremes of their development. Complete interruption to the white bands on hind tarsal segments II–IV can be produced by low temperatures of larval environment. The presence or absence of a white streak under the proboscis may be due to differences in hereditary constitution, but there is also, in males, a greater tendency for a streak to be present in specimens reared at higher temperatures.

It is possible that in other species of the *scutellaris* subgroup, these characters may be genetically fixed. In this connection it may be noted that Waddington (1952) has shown experimentally, in *Drosophila melanogaster*, that in the course of selection, a genetic constitution may be synthesized, which under normal conditions produces the same effect as was originally found only as a response to the stimulus of an abnormal environment.

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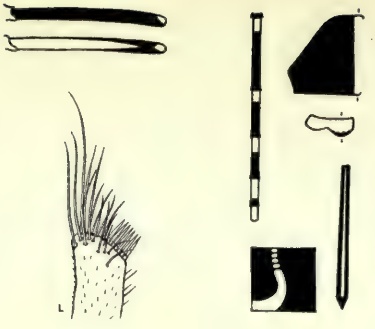
PLATE 18

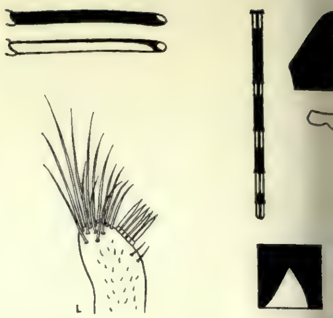
Comparative figures of species of the *Aedes (Stegomyia) scutellaris* group, arranged approximately in their geographical relationships.

All drawings, except basal lobe, diagrammatic.

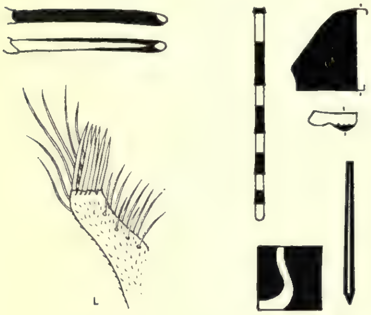
- ○ - from published descriptions and figures.
- ⊖ - specimens seen, basal lobe from published figures.
- ⦶ - specimens seen, basal lobe from freehand drawings.
- ⊕ - specimens seen, basal lobe from scale drawings.



riversi R. Bohart & Ingram ⊖



guamensis Farner & R. Bohart ⦶



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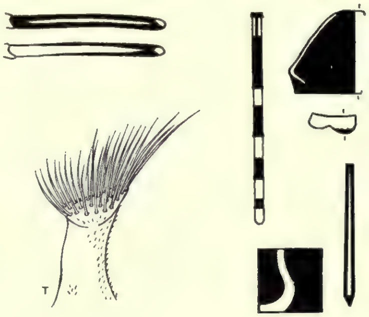

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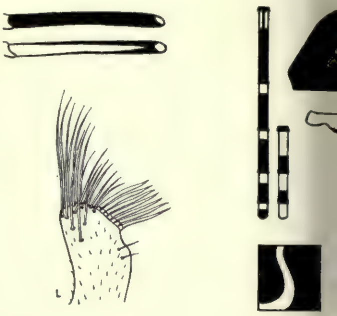

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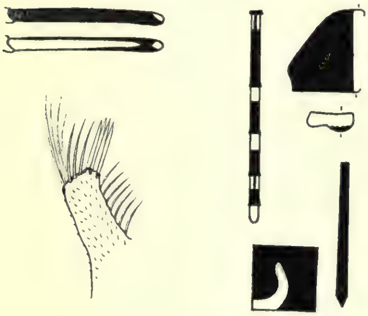

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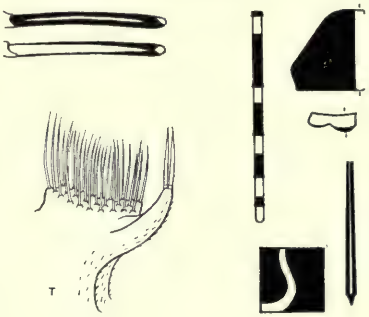
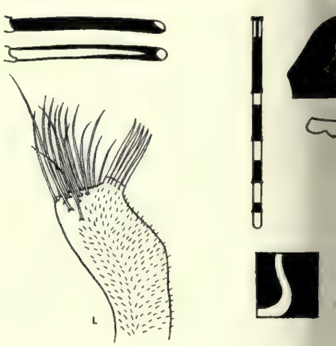
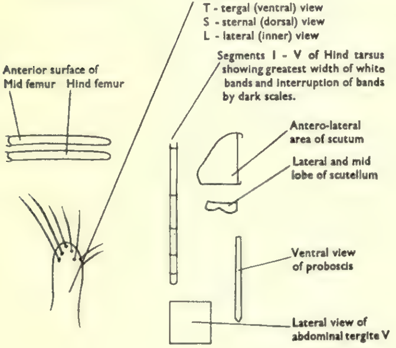


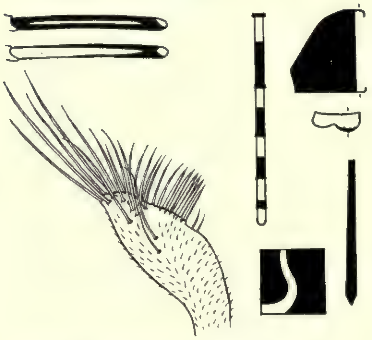
alorensis Bonne-Wepster & Brug ⦶



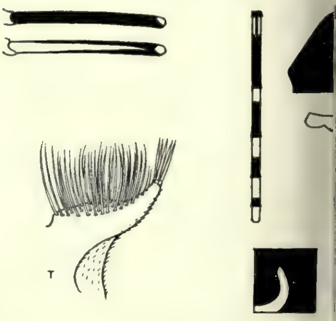
scutellaris scutellaris (Walker) ⊕

KEY FIGURE

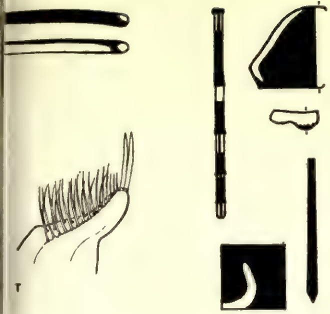

Basal lobe of left coxite of ♂
T - tergal (ventral) view
S - sternal (dorsal) view
L - lateral (inner) view
Segments I - V of Hind tarsus showing greatest width of white bands and interruption of bands by dark scales.
Anterior surface of
Mid femur
Hind femur
Antero-lateral area of scutum
Lateral and mid lobe of scutellum
Ventral view of proboscis
Lateral view of abdominal tergite V



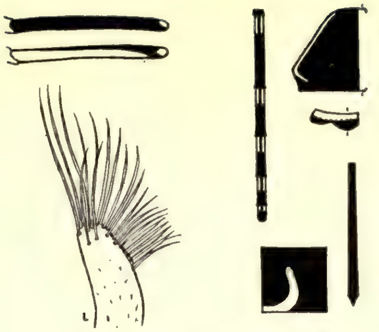
scutellaris katherinensis Woodhill ⊕



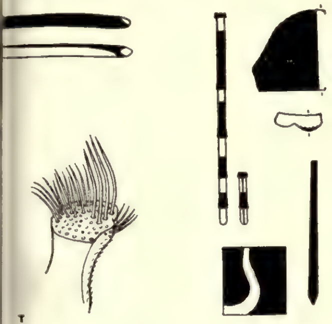
pernotatus Farner & R. Bohart ⦶



scutoscriptus R. Bohart & Ingram ⊖



hakanssoni Knight & Hurlbut Φ



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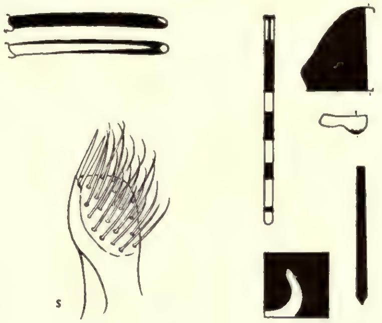

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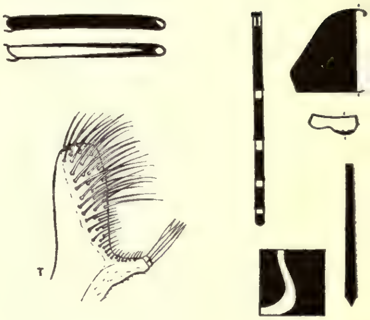
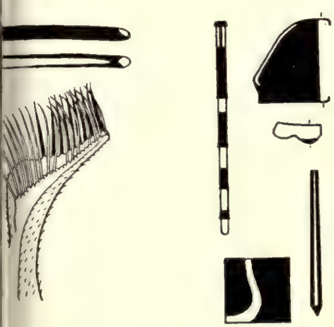
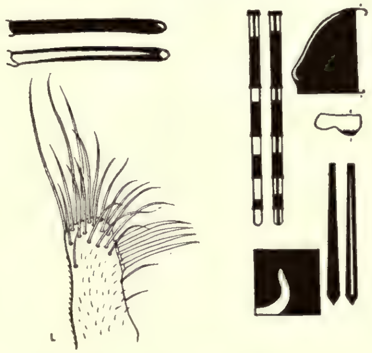


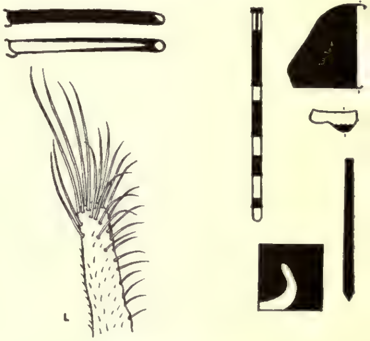
marshallensis Stone & R. Bohart O



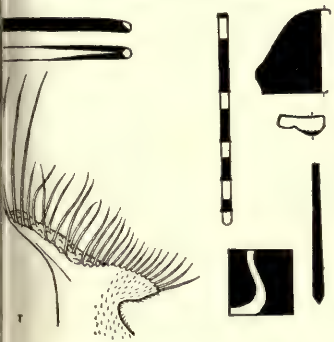
asiscutellaris Farner & R. Bohart ⊕



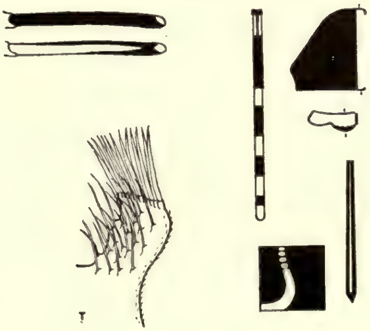
pseudoscutellaris (Theobald) ⊕



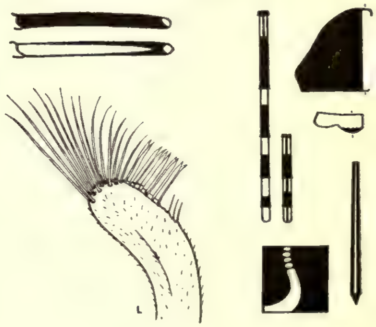
polynesiensis Marks ⊕



gurneyi Stone & R. Bohart ⊕



horrescens Edwards ⊕



tongae Edwards ⊕

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A NEW GENUS AND SOME NEW SPECIES OF THE CHAULIODINI (MEGALOPTERA)

D. E. KIMMINS

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A NEW GENUS AND SOME NEW SPECIES OF THE CHAULIODINI (MEGALOPTERA), WITH NOTES ON CERTAIN PREVIOUSLY DESCRIBED SPECIES

By D. E. KIMMINS

SYNOPSIS

The greater part of this paper is devoted to descriptions of eleven new species or subspecies and a new genus from Oriental, Australian and Chilean localities. The types of some species described by Walker, McLachlan and Weele have been re-examined, and new figures of genitalia prepared, and an artificial key for the identification of the genera of the Chauliodini is given.

THE tribe Chauliodini may be distinguished by the following diagnosis: Antennae moniliform, serrate or pectinate in the male, moniliform, subserrate or, more rarely, pectinate in the female. Normally not more than three cross-veins between the radius and its sector. In the hind wing the basal *r–m* cross-vein is present, obsolescent or entirely absent. Cu_1 with only one branch beyond the inter-cubital cross-vein.

Male genitalia with only one pair of appendages. Ninth tergite moderately sclerotized, somewhat hood-shaped. Sternite generally less sclerotized than tergite, forming a variously shaped subgenital plate, whose apical margin is often produced in a transparent triangular lobe. Tenth tergite forming a pair of anal plates or claspers, differing in shape in the various species and variously armed on the inner surface with black spinules or comb-like teeth. There is a group of trichobothria forming a more or less convex wart on the outer surface. Tenth sternite generally membranous although occasionally (*Ctenochauliodes*) it forms a sclerotized plate. Aedeagus hinged to the lower basal angle of the ninth tergite, trough- or scoop-like, simple or bifid at its apex.

♀ GENITALIA. Eighth sternite more or less sclerotized, sometimes produced apically as a subgenital plate. Ninth tergite deep, its lateral margins produced downwards almost across the segment; to their lower angles are attached a pair of foliate lateral gonapophyses. Ninth sternite apparently membranous. Tenth segment forming a pair of cercoid anal plates, of varying form, each with a group of trichobothria.

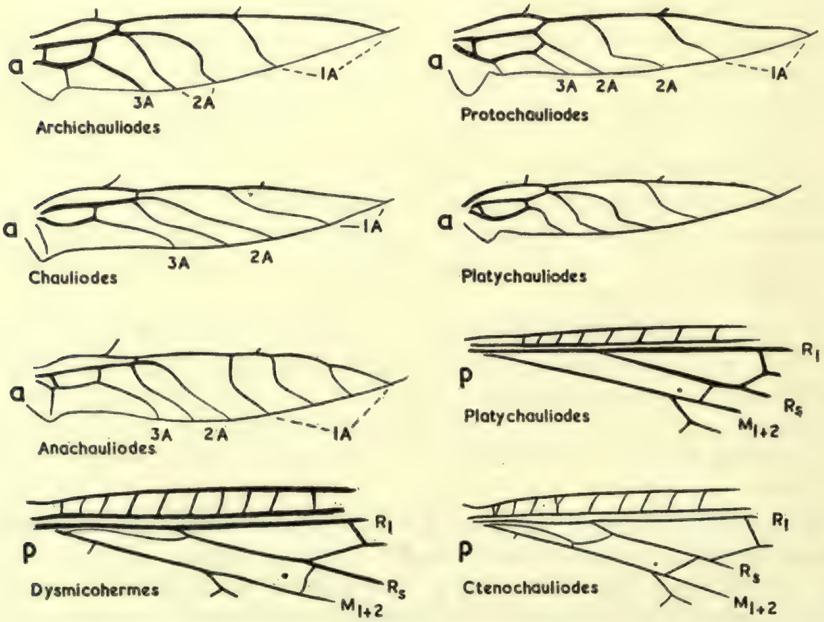
The known distribution of the tribe is somewhat discontinuous, although further collecting and study may cause us to modify our conclusions. There appears to be a small Antarctic element consisting of two genera, with representatives in Australia, New Zealand and Chile, one of the genera also possibly extending northward into California. There are two genera occurring in South Africa, one of which is fairly closely related to *Protochauliodes* from Australia and Chile and the other has a near relative in Madagascar.

The Nearctic region contains at least four genera in addition to possible representatives of the Antarctic genus referred to above. The Oriental region appears to be richest in described species and subspecies and contains four genera, of which three spread northward into the Manchurian-Japanese sub-region of the Palaearctic fauna. The majority of the species occur in the Indo-Chinese sub-region.

Certain genera exhibit sexual dimorphism in the antennae and while such characters will serve to separate the males generically, it has not been easy to find venational characters which will serve equally for both sexes. The wing venation of the tribe is rather uniform, although at the same time subject to aberration. In the generic key, separate male and female characters have been used to distinguish *Protochauliodes* from *Neohermes*, but with *Parachauliodes* and *Neochauliodes* I have failed to find a satisfactory character to separate the females. It should be pointed out that in both sexes the abdomen shrinks considerably in drying and that the form of the genitalia can often only be clearly made out after removal and treatment in KOH solution. All the genitalia drawings in this paper have been made from dissections so treated.

KEY TO GENERA OF CHAULIODINI

1. Posterior branch of Rs in both wings forked; anterior branch of M in hind wings forked . . . . DYSMICOHERMES Munroe.
–. Posterior branch of Rs in both wings simple; anterior branch of M in hind wings forked or simple . . . . 2.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Protochauliodes
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Chauliodes
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Platychauliodes
a
3A
2A
1A
Anachauliodes
p
R1
Rs
M1+2
Platychauliodes
p
R1
Rs
M1+2
Dysmicohermes
p
R1
Rs
M1+2
Ctenochauliodes

FIG. 1.—Anal area of fore wing, *a*, and anterior basal area of hind wing, *p*.

2. In fore wing, anterior branch of 2A partly fused with 1A, this branch appearing to arise from 1A; a pigmented area immediately basad of this apparent origin . . . 3.
–. In fore wing, anterior branch of 2A not fused with 1A, but either it or the stem of 2A connected to 1A by a cross-vein . . . 5.
3. Anterior branch of M in hind wing forked . . . 4.
–. Anterior branch of M in hind wing simple . . . TAENIOCHAULIODES Esben-Petersen.
4. Male antenna without a whorl of erect hairs on each segment; lateral gonapophyses of ninth segment of female with a small apical cercus. No cross-vein in marginal fork of R_3 in fore wing (sometimes absent in *Neohermes*) . PROTOCHAULIODES Weele.[1]
–. Male antenna with erect hairs on each segment other than the basal; lateral gonapophyses of female without small apical cercus: cross-vein in marginal fork of R_3 in fore wing generally present . . . NEOHERMES Banks.
5. Species from Australia, New Zealand, Chile, S. Africa or Madagascar . . . 6.
–. Species with a Nearctic or Oriental distribution . . . 7.
6. Species from Australia, New Zealand or Chile; wings generally long and narrow ARCHICHAULIODES Weele.[2]
–. Species from S. Africa or Madagascar; wings relatively broader PLATYCHAULIODES Esben-Petersen.[3]
7. Nearctic species . . . 8.
–. Oriental species . . . 9.
8. Wings mainly blackish brown, with opaque creamy white markings NIGRONIA Banks.
–. Wings greyish hyaline, venation with fuscous spots . . . CHAULIODES Latreille.
9. 1A in fore wing with three or four branches . . . ANACHAULIODES gen. n.
–. 1A in fore wing with only two branches . . . 10.
10. In fore wing, fork of 2A with a definite footstalk . . . 11.
–. In fore wing, fork of 2A sessile . . . CTENOCHAULIODES Weele.
11. Male antenna serrate, anal plates horizontally bilobed . . . PARACHAULIODES Weele.
–. Male antenna pectinate, anal plates simple . . . NEOCHAULIODES Weele.

Archichauliodes guttiferus (Walker).

Figs. 2, 3.

Hermes guttiferus Walker, 1853, *List Neur. Ins.* B.M. **2**: 204.
Chauliodes guttiferus (Walker), McLachlan, 1867, *J. Linn. Soc. Zool.* **9**: 260; McLachlan, 1869, *Ann. Mag. Nat. Hist.* (4) **4**: 39. Weele, 1907, *Notes Leyden Mus.* **28**: 252, figs. 19, 20; pl. 4, fig. 2.
Archichauliodes guttiferus (Walker), Weele, 1910, *Cat. Coll. Zool. Selys*, fasc. **5**(1): 48. Tillyard, 1926, *Ins. Aust. N. Z.*: 313.

Examination of the material over this name in the British Museum (N.H.) revealed the presence of three species with almost identical wing markings but entirely distinct genitalia in both sexes. This raised the question to which of the three should the name *guttiferus* Walker be applied. Walker's type has for many years lacked antennae and abdomen and I have seen no statement in print as to its sex. The female example figured by Weele (1907, pl. 4, fig. 2) is certainly not the type.

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[1] The unique ♀ type of *P. dubitatus* (Walker) differs from the true *Protochauliodes* in having the basal *r-m* cross-vein completely lacking in both hind wings. In view of the fact that it is a unique, from an unknown locality (variously suggested to be New Zealand or S. America) and possibly aberrant, it is proposed to leave it for the present in *Protochauliodes*. One must not overlook the possibility of its being an aberrant *Neohermes*, the transverse fuscous band in the basal part of the fore wing at the level of the cubital fork certainly resembling that found in *Neohermes*.

[2] In *Archichauliodes diversus* (Walker) from New Zealand the basal *r-m* cross-vein in the hind wing appears to be very unstable and often obsolete.

[3] Paulian's figure of the venation of his *Madachauliodes torrentialis* shows no basal *r-m* cross-vein in the hind wing, and would thus run out in this key to *Platychauliodes*, from which it appears to differ in a longer fork to Cu_1 in both wings.

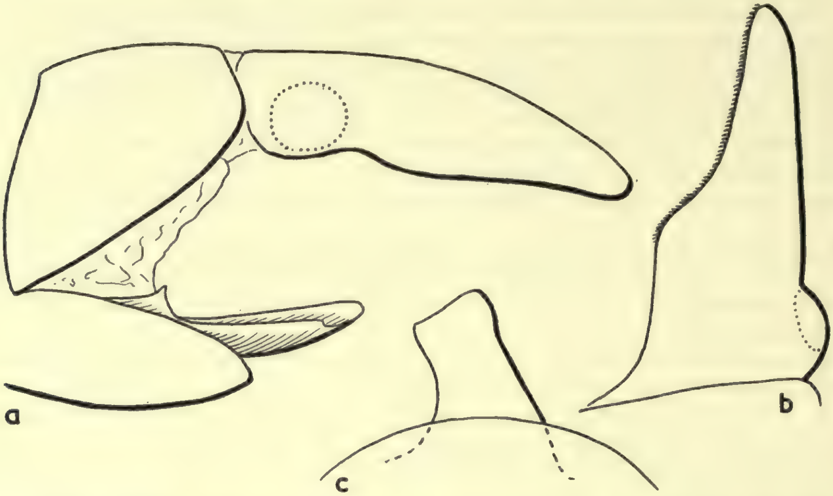

FIG. 2.—*Archichauliodes guttiferus* (Walker). Male genitalia. *a*, lateral; *b*, left anal plate, dorsal; *c*, ninth sternite and aedeagus, ventral.

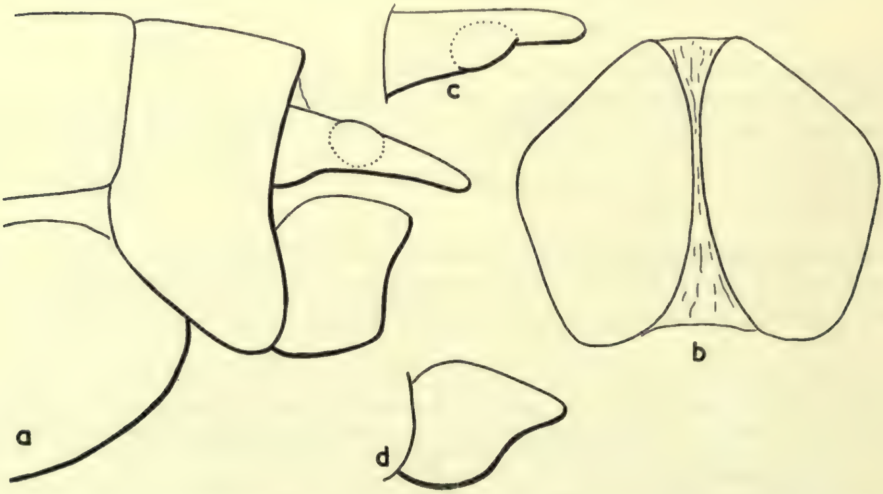

FIG. 3.—*Archichauliodes guttiferus* (Walker). Female genitalia. *a*, lateral; *b*, eighth sternite, ventral; *c* and *d*, anal plate and lateral gonapophyses, lateral, from another specimen.

The antennae and abdomen may even have been missing at the time of the original description, since neither part is mentioned and Walker quotes the length of the body with a question-mark.

Before attempting a decision as to the identity of Walker's *guttiferus*, preparations of the abdomens of a number of females (excluding *A. deceptor* sp. n. from Queensland) were made and these, while showing some individual variation, seemed to fall into two groups on the structure of the eighth abdominal sternite. Comparison of the wing pattern of these two groups then revealed some not very easily defined differences, and by comparing Walker's type with these two groups, it appeared to resemble most closely the group the males of which agreed with the figures of the genitalia given by Weele (1907, figs. 19–20). It is fortunate that we are thus able to retain Weele's interpretation of this species. To facilitate identification of these very similar-looking species I am describing and figuring Walker's *guttiferus* as well as the two new species. Examination of long series of Australian material may perhaps prove that what I have considered to be individual variations are really specific differences, but this is a matter which can only be decided by Australian students.

Body-colour fuscous. Antennae, palpi and bases of ocelli piceous. Pronotum a little longer than broad, tapering slightly anteriorly. Legs uniformly fuscous. Abdomen reddish black, anal appendages piceous. Wings elongate, apices ovate ; membrane slightly brownish hyaline, venation pale fuscous. Fore wing lightly speckled with small brownish dots between the veins, and with rather larger ones at the origin of Rs, and along the costal margin before and after the pterostigma. Hind wing with a few brownish dots in the apical part of the wing, and with four larger spots, two along the costal margin (one at each end of the pterostigma) and the other two between Rs and M, surrounding the facetic spots. The basal of these spots usually overlaps both Rs and M. The hind wing spots sometimes enclose paler areas, giving them a pupillate appearance.

♂ GENITALIA. Ninth sternite about as long as tergite, forming a broad subgenital plate. Anal plates about one and one-half times as long as ninth segment. From the side, each is slender, tapering gradually to apex and slightly down-curved, with a group of trichobothria at its base. From above it is broad at its base, abruptly narrowed about midway to half its width and then gradually narrowing to apex, inner margin spinose. Aedeagus with an arched base, centre of its apical margin produced in an asymmetric, obliquely truncate lobe. There appears to be some individual variation in the length and shape of this lobe.

♀ GENITALIA. Eighth sternite divided longitudinally into two broad sclerites, linked by membrane. Ninth tergite deep, lower angles obliquely truncate ; lateral gonapophyses short, sub-quadrate, upper margin convex, apical margin slightly concave, upper apical angle more or less produced. Anal plates long, slender.

Length of fore wing, 23–30 mm.

Holotype (lacking antennae and abdomen, sex doubtful, locality unknown) in Brit. Mus. (N.H.). Additional examples in this collection from AUSTRALIA : New South Wales, Upper Murrumbidgee River, Rule's Point, 4,450 ft., 20.xii.1934 (R. J. Tillyard) and Mt. Kosciusko, 2,700 ft., 22.i.1885, 16.i.1888. Victoria, Melbourne.

Archichauliodes plomleyi sp. n.

Fig. 4.

AUSTRALIA: New South Wales, Mt. Irvine, 2,300 ft., 25.xii.1934 (N. J. B. Plomley), holotype ♂, allotype ♀ and 2 ♂ paratypes; Heathcote, bred 26.xii.1916, (R. J. Tillyard), 1 ♀ paratype; no other data, Saunders, 68–3, 1 paratype (without abdomen).

Victoria, Melbourne, 1 paratype (lacking apex of abdomen). Australia, no other data, 3 ♀, 1 ? (lacking abdomen), paratypes. All the above examples in Brit. Mus. (N.H.).

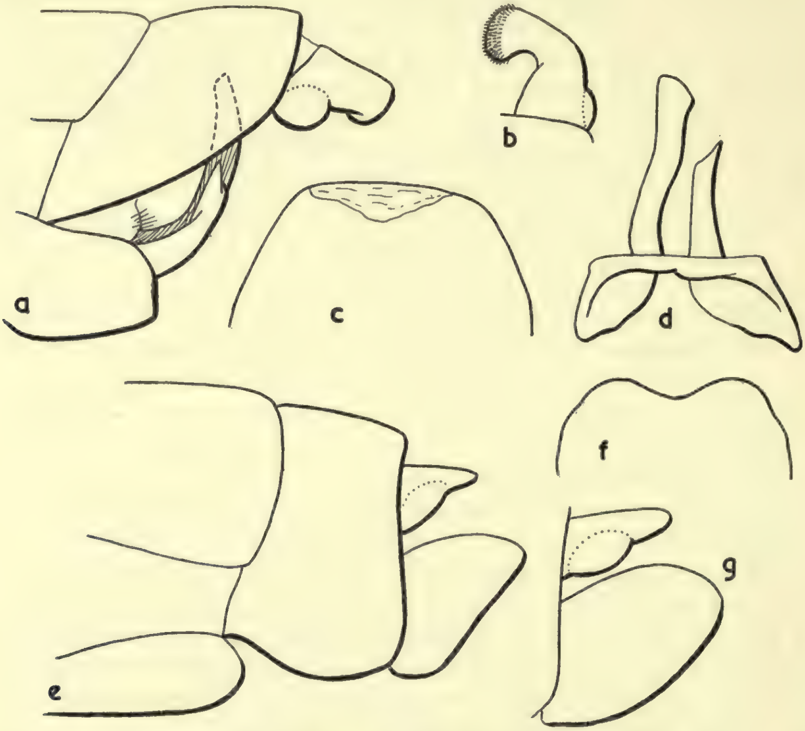

FIG. 4.—*Archichauliodes plomleyi* sp. n. Genitalia, male *a–d*; female *e–g*. *a*, lateral; *b*, left anal plate, dorsal; *c*, ninth sternite, ventral; *d*, aedeagus, dorsal; *e*, lateral; *f*, eighth sternite, ventral; *g*, anal plate and lateral gonapophyses of another example.

General appearance as in *A. guttiferus* (Walker). The fore wing spots are perhaps a little less dense. Hind wing with four or five large fuscous spots, usually smaller than in *guttiferus* and with the basal spot usually not or only slightly overlapping Rs and M. Spots not pupillate. Fifth spot, when present, over the inter-cubital cross-vein.

♂ GENITALIA. Ninth sternite rather shorter than the overhanging tergite, forming a broad subgenital plate, its apical margin flattened and semi-membranous. Anal plates short, from above sharply bent inwards, apices clavate and spinose ; there is a large, rounded, basal group of trichobothria. Aedeagus forming a truncate basal arch, from which arise two stout, up-curved, unequal spines, one acute, the other truncate at apex.

♀ GENITALIA. Eighth tergite entire, sclerotized, from beneath parallel-sided, apical angles produced in rounded lobes. Ninth tergite deep, lateral gonapophyses forming flattened, ovate or pyriform valves. Anal plates short, conical, varying somewhat in width at base.

Length of fore wing, 24–28 mm.

Holotype ♂, allotype ♀, each with abdomen mounted in canada balsam. Apart from the differences already mentioned above, *A. plomleyi* may be separated from *guttiferus* by the short, incurved anal plates and the two asymmetric spines of the aedeagus in the male and by the entire eighth sternite with rounded apical lobes and the shorter anal plates in the female.

The collector informs me that Mt. Irvine is one of the Western mountain range, about seventy miles west of Sydney.

Archichauliodes deceptor sp. n.

Fig. 5.

AUSTRALIA : Queensland, Toowoomba, 2,000 ft., 10.xii.1884, 1 ♂, holotype ; no other data (F. P. Dodd), 1 ♀, allotype, 1 ♀ paratype. All in Brit. Mus. (N.H.).

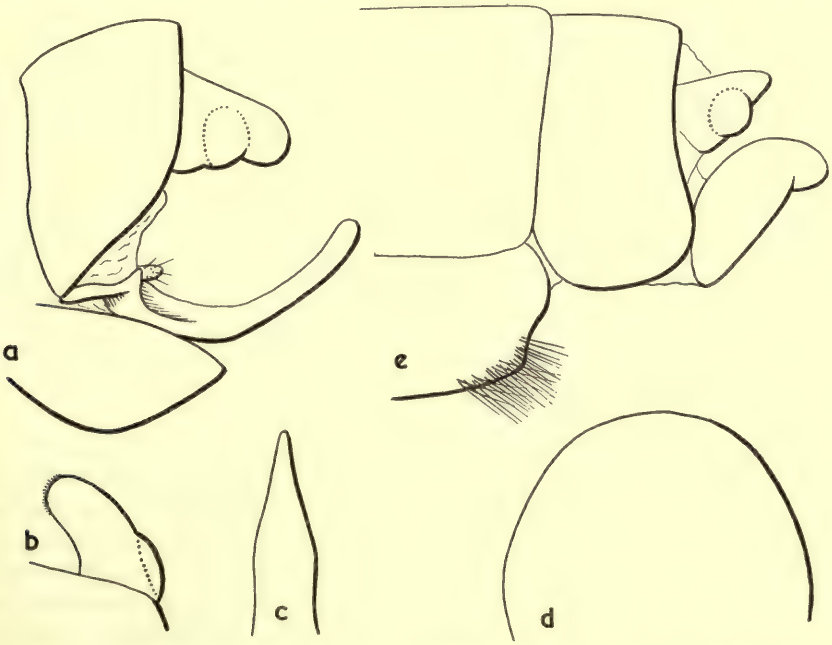

FIG. 5.—*Archichauliodes deceptor* sp. n. Genitalia, male *a–d*, female *e*. *a*, lateral, *b*, left anal plate, dorsal ; *c*, aedeagus, ventral ; *d*, ninth sternite, ventral ; *e*, lateral.

In general appearance scarcely distinguishable from *A. guttiferus* and *A. plomleyi*. The femora and tibia are generally lighter than the tarsi, with a darker patch at the apex of the femora.

♂ GENITALIA. Ninth tergite hooded, its apical margin slightly convex. Ninth sternite about as long as tergite, apical margin rounded, not membranous. Anal plates short, stout, somewhat incurved, with a large lateral group of trichobothria. Aedeagus long, slender, up-curved, not asymmetric, apex rounded from the side, pointed from beneath.

♀ GENITALIA. Eighth sternite sclerotized, pigmented, before the apex elevated in two low, rounded, hairy mounds. Ninth segment moderately deep, lateral gonapophyses about as long as segment, rather narrow, directed obliquely upwards, apex bent somewhat tailward and rounded. Anal plates short, conical, each with a large lateral group of trichobothria.

Length of fore wing : ♂ 25 mm. ; ♀ 27 mm.

Holotype ♂, allotype ♀ each with abdomen mounted in canada balsam. In both male and female genitalia this species is more nearly related to *plomleyi* than *guttiferus*. The male differs from the former in its less incurved anal plates and in the long single spine of the aedeagus. The female differs in the less developed eighth sternite and in the shape of the anal plates and lateral gonapophyses.

Archichauliodes australica sp. n.

Fig. 6.

AUSTRALIA : New South Wales, Upper Murrumbidgee River, Rule's Point, 4,450 ft., 20.xii.1934 (R. J. Tillyard), 1 ♀, holotype, in Brit. Mus. (N.H.).

Body-colour dark fuscous. Mandibles pale yellowish. Antennae filiform, the segments very slightly inflated on inner side but scarcely subserrate. Lateral margins of head behind eyes with a fringe of short silvery hair. Abdomen with obscure, transverse, fulvous lines.

Wings elongate, acutely rounded at apices. Membrane greyish hyaline with brownish venation, fore wing with three conspicuous brown markings in the stigmal area and with numerous small brown spots along the veins and encroaching on the membrane. Hind wing practically without markings other than the brownish stigmal area. Venation much as in *guttiferus* but costal cross-veins in fore wing less numerous and straighter. In the right wing there is an aberrant cross-vein connecting the basal *r–m* cross-vein with M.

♂ GENITALIA. Ninth tergite large, hooded, its apical dorsal margin with a wide shallow triangular excision ; sternite short, broad, apical margin forming a flattened ellipse. Anal plates stout, in side view with a rounded lobe on lower margin about midway, then tapering to a rounded apex. The group of trichobothria are situated on a projecting ovate wart close to the base. From above the inner margin produced in a triangular lobe, set with spinules. Aedeagus forming an arched plate, in dorsal view the basal arms spirally twisted about midway. The centre of the arch is produced in two slightly incurved plates, their upper basal margins fused and elevated in a triangular lobe as seen from the side.

Length of fore wing, 25 mm.

Type ♂ with abdomen mounted in canada balsam. This specimen may well be one of those referred to by Tillyard (1926, *Ins. Aust. N.Z.* : 313) " the mountain forms [of *A. guttiferus*] closely resemble the New Zealand species." After the publication of this work he took typical *A. guttiferus* at the same locality as this new species, which differs from *A. guttiferus* (Walker) in the almost complete absence of spots, apart from those along the fore wing veins, the more pointed wings, less moniliform antennae and shorter, blunter anal plates.

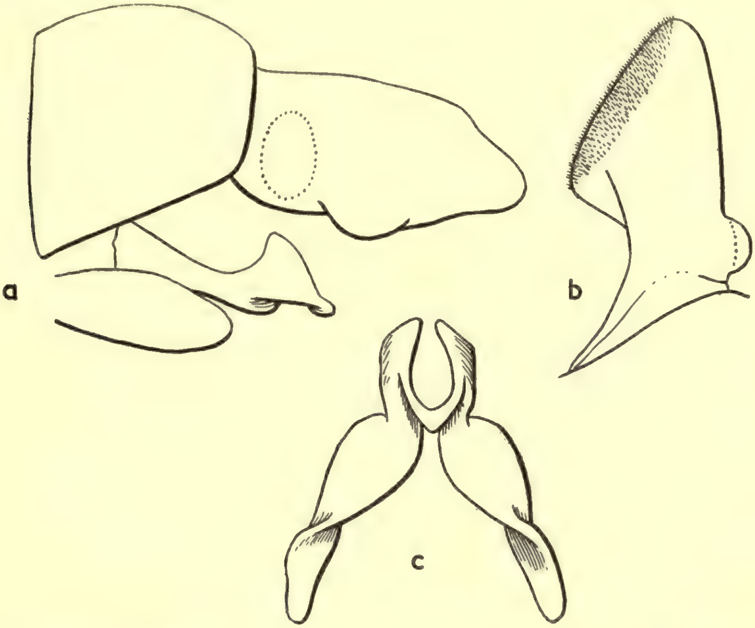

FIG. 6.—*Archichauliodes australica* sp. n. Male genitalia. *a*, lateral ; *b*, left anal plate, dorsal ; *c*, aedeagus, dorsal.

Archichauliodes chilensis sp. n.

Figs. 7, 8.

S. AMERICA : Chili (Calvert), 1 ♂, holotype, 1 ♀, allotype ; (Reed), 3 ♀ paratypes ; (McLachlan collection), 1 (lacking abdomen), paratype. S. Chili, Araucania (R. M. Middleton), 1 ♀, paratype. All in Brit. Mus. (N.H.).

Antennae moniliform in both sexes, dull blackish brown, the two basal segments shining reddish brown. Body dull reddish or blackish brown, head with a patch in front of each antenna, and the back of the head, orange-brown. Wings elongate-elliptical, apices a little less acute in male than in female, membrane pale brownish hyaline, venation brownish, some of the longitudinal veins in hind wing narrowly bordered with brownish. In fore wing the membrane is lightly speckled with darker brown adjoining the veins, and in the apical half of the wing there is a brownish streak running longitudinally through the cells. The pterostigma is more heavily marked with two brownish spots, and there is a brownish cloud over the fork of 2A.

♂ GENITALIA. Ninth sternite from beneath parabolic, with a semi-membranous, triangular process extending beyond its apex (much as in *A. diversus* (Walker)). Anal plates short and stout, in side view slightly curved downward near the apex, which is truncate. From above, the apex is rounded and clothed internally with dense black spinules. Beneath these appendages is the aedeagus, hinged at its basal angles to the lower angles of the ninth tergite. From above it resembles an inverted " V," with a blunt, bifid apex, which in the holotype is somewhat asymmetric. The outer margin of each apical lobe is armed with a small acute tooth. From the side these lobes are directed obliquely upward.

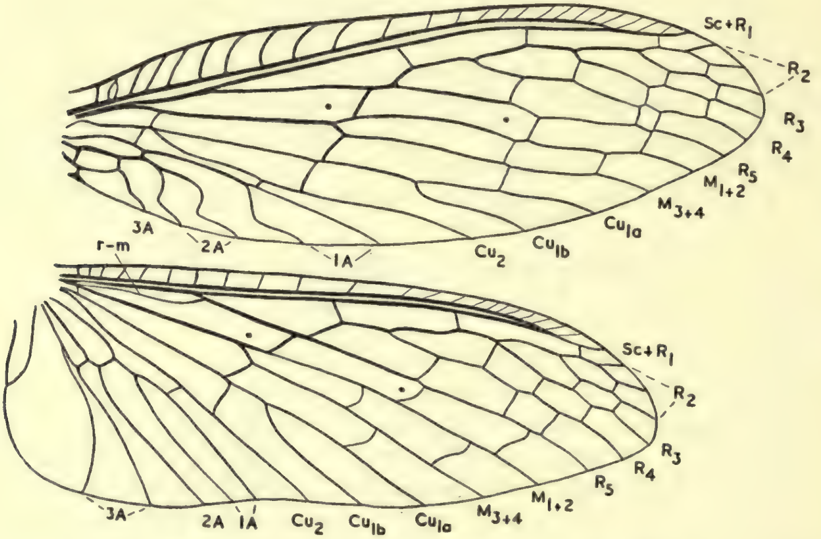

FIG. 7.—*Archichauliodes chilensis* sp. n. Male wings.

♀ GENITALIA. Eighth sternite more sclerotized than its tergite, somewhat produced apically in a subgenital plate. Ninth tergite as deep as eighth segment, mainly sclerotized but with a wide, apical, membranous area simulating an excision. The lower basal margins of the tergite overlap the eighth sternite; lateral gonapophyses elongate and slightly tapering from base to apex. Ninth sternite membranous. Anal plates short, each rather stout at the base and bearing a large, rounded group of trichobothria, apex finger-like and somewhat flexible.

Length of fore wing: ♂ 27 mm.; ♀ 29–42 mm.

This species in general appearance resembles *Protochauliodes cinerascens* (Blanchard), but may be separated from it by the stalked condition of the fork of 2A in the fore wing and by the more basal position of the first fork of Rs in both wings.

From *A. diversus* (Walker) it may be separated by the absence of any brown speckling along the branches of Rs in the hind wing and by the shape of the anal plates, the aedeagus beneath them and of the ninth sternite.

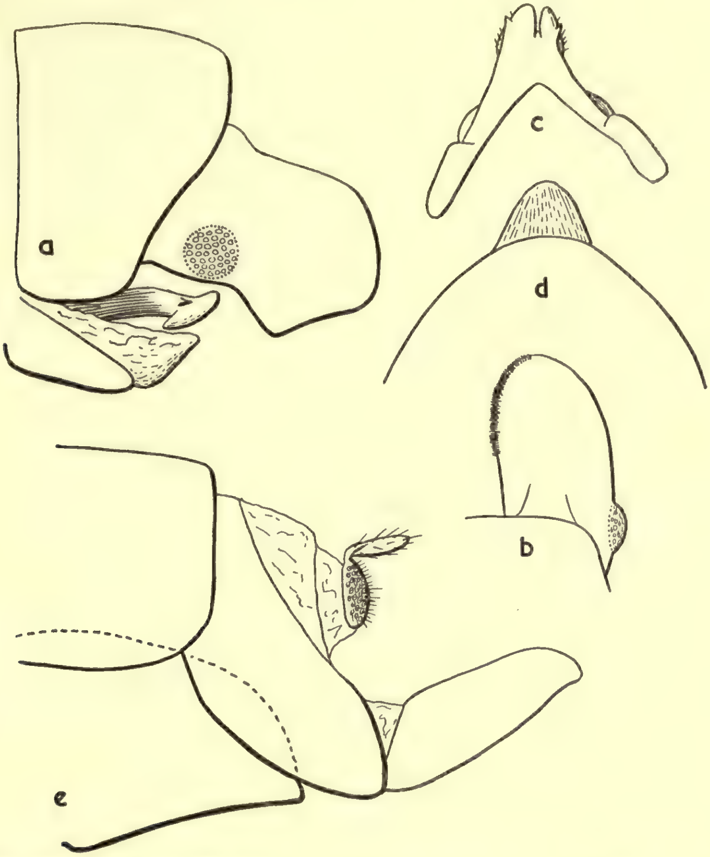

FIG. 8.—*Archichauliodes chilensis* sp. n. Genitalia, male *a–d*, female, *e*. *a*, lateral; *b*, left anal plate, dorsal; *c*, aedeagus, dorsal; *d*, ninth sternite, ventral; *e*, lateral.

ANACHAULIODES gen. n.

♂. Antenna pectinate. Wings with apical branches of Rs somewhat curved posteriorly near apices. In fore wing, 1A with three or four branches, fork of 2A sessile, anterior branch not fused with 1A. In hind wing, basal *r–m* cross-vein obsolete.

♂ GENITALIA. Ninth segment not more sclerotized than eighth. Tenth segment forming two large anal plates, apical margin excised, inner surface with a few strong teeth on a small projection. Aedeagus large, strongly sclerotized, hooked downward.

♀ unknown.

Type species, *Anachauliodes tonkinicus* sp. n.

In general appearance, this genus recalls the North American genus *Chauliodes*, from which it differs in the more branched 1A and the more curved apical branches of Rs in the fore wing. The latter character recalls *Neochauliodes*, from which it differs in the obsolete *r–m* cross-vein at the base of the hind wing, as well as the more branched 1A in the fore wing.

Anachauliodes tonkinicus sp. n.

Figs. 9, 10.

TONKIN: Ngai-Tio, 4,800 ft., 22.v.1924 (H. Stevens), 1 ♂, holotype, Brit. Mus. (N.H.).

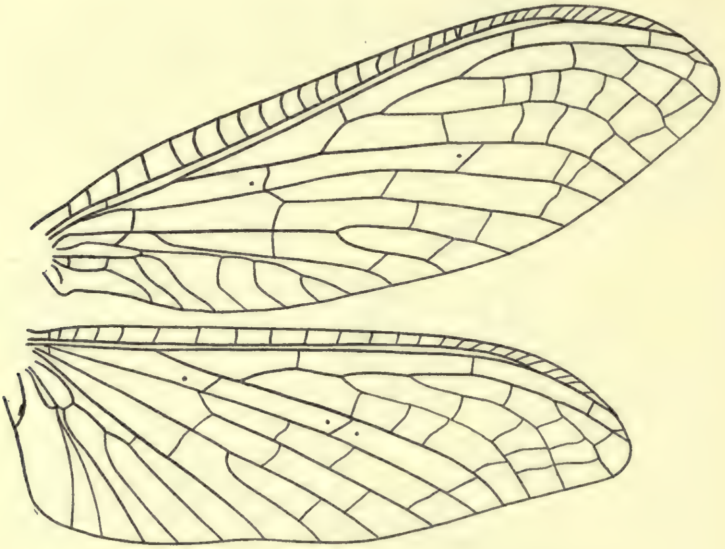

FIG. 9.—*Anachauliodes tonkinicus* gen. sp. n. Male wings.

Body-colour light fuscous. Antenna piceous, strongly pectinate. Labrum, anteclypeus and mandibles fulvous. Pronotum about as broad as long, slightly narrowed anteriorly. Legs fuscous, femora with a fulvous stripe above. Wings greyish hyaline, venation of fore wing luteous with fuscous interruptions, hind wing mainly fuscous. Fore wing with a dark fuscous patch in costal area basad of the creamy pterostigma, several fuscous spots in subcostal area, a fuscous patch near base of wing, a paler fuscous cloud across the centre of the wing and with fuscous irrorations spreading out from the vein markings. Costal cross-veins fuscous. Hind wing practically without markings.

♂ GENITALIA. Ninth segment scarcely more sclerotized than eighth, tergite somewhat extended in a hood, sternite forming a short, rounded subgenital plate. Anal plates large, each with a central group of trichobothria. Apical margin of anal plate produced in two rounded lobes, separated by an excision. The upper lobe is the smaller and carries on its lower inner surface a short, dentiferous projection. Lower lobe about twice as deep as upper. Aedeagus large, heavily sclerotized, from the side curved downward, with an acute, hooked apex. The upper surface is produced to form two recurved, triangular plates, from the side appearing as a hook. From above, the aedeagus arises from a wide, arched base, parallel-sided as far as the recurved plates, then narrowed and tapering to the down-turned apex.

Length of fore wing, 43 mm.

Type with abdomen mounted in canada balsam.

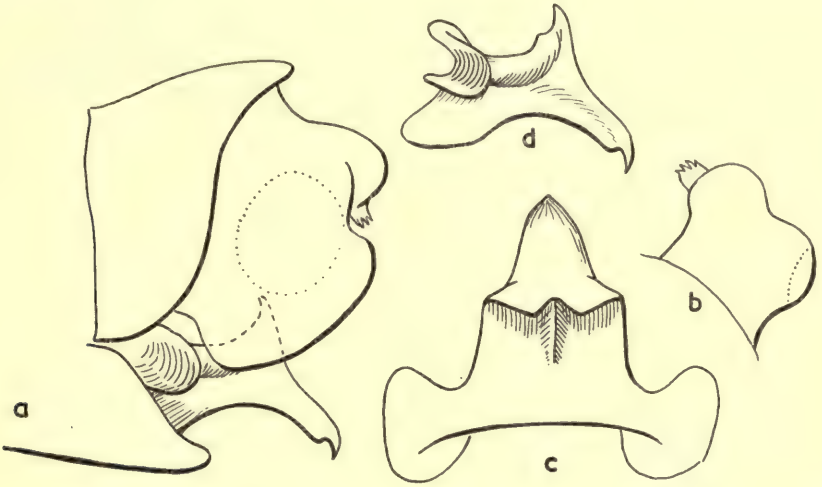

FIG. 10.—*Anachauliodes tonkinicus* gen. sp. n. Male genitalia. *a*, lateral; *b*, left anal plate, dorsal; *c*, aedeagus, dorsal; *d*, aedeagus, lateral.

CTENOCHAULIODES Weele

Weele, 1909, *Notes Leyden Mus.* **30** : 263 ; id., 1910, *Coll. Zool. Selys*, **5** (1) : 70.
Type species, *Chauliodes nigrovenosus* Weele, 1907.

Antennae pectinate in female and probably in male also. In hind wing, basal *r–m* cross-vein strong and re-connected to M by a cross-vein. In the genitalia of the presumed male, there is a sclerotized plate beneath the anal plates, probably the tenth sternite. It is possible that in some other genera (such as *Neohermes*) this plate has become fused to the aedeagus.

Ctenochauliodes forcipatus sp. n.

Fig. 11.

CHINA : [Szechwan?], Kwanshien, July 1930 (G. M. Franck), ♂ holotype.
W. CHINA : Chin-Fu-San (W. A. Maw), ♂ paratype. (Both in Brit. Mus. (N.H.)).
Body-colour reddish brown. Antennae broken, with only two basal segments

remaining (probably pectinate). Labrum reddish piceous, inter-ocellar space piceous, palpi fuscous. Legs dark fuscous. Membrane of wings brownish hyaline, fore wing with dark fuscous markings forming vague clouds, more particularly at base and apex of costal area. Venation reddish brown, costal cross-veins in fore wing sinuously bent in basal half of wing.

♂ GENITALIA. Ninth tergite short and deep, sternite forming a wide, rounded subgenital plate, its apical margin produced in a triangular, membranous lobe. Anal plates from side deep at base, upper angle produced in a stout finger, incurved, lower apical angle of the finger further produced inward in a triangular lobe. Group of trichobothria set low down on anal plate. Beneath the anal plates is a pigmented, sclerotized plate, probably the tenth sternite, its lower angles projecting in rounded, hairy processes. Aedeagus forming a pair of thin, rounded plates with slender bases. These plates are slightly asymmetric, fused for a short distance medially and slope downwards in roof-fashion from the centre line.

Length of fore wing, 27 mm.

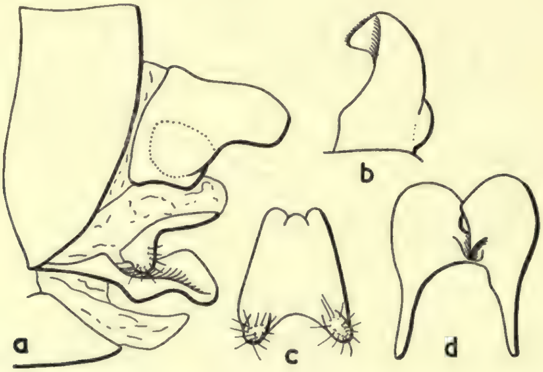

FIG. 11.—*Ctenochauliodes forcipatus* sp. n. Male genitalia. *a*, lateral; *b*, left anal plate, dorsal; *c*, tenth sternite, from behind; *d*, aedeagus, dorsal.

Holotype and paratype each with apex of abdomen mounted in canada balsam. The paratype has the wings damaged, as also is the apex of the abdomen, but as far as can be ascertained it appears to be conspecific with the type. This species differs from *C. nigrovenosus* (Weele) in the much more uniformly coloured wings.

PARACHAULIODES Weele

Weele, 1909, *Notes Leyden Mus.*, **30** : 250 ; id., 1910, *Coll. Zool. Selys*, fasc. **5** (1) : 58.
Type species (original designation), *Chauliodes japonicus* McLachlan, 1867.
= *Metachauliodes* Weele, 1910, *Coll. Zool. Selys.* fasc. **5** (1) : 46, 55, 61. (*Lapsus calami.*)

The figures and descriptions of the male genitalia given by Weele were based upon dried material and are not entirely satisfactory. New figures and descriptions have been made, from preparations cleared in KOH solution, of the two species. It should be noted that the actual illustrations nos. 47 and 48 in Weele's monograph on the Sialidae have been transposed, the lateral view of *continentalis* appearing with the ventral view of *japonicus*.

Parachauliodes japonicus (McLachlan)

Fig. 12.

Chauliodes japonicus McLachlan, 1867, *J. Linn. Soc. Zool.* **9** : 232.
Parachauliodes japonicus (McLachlan) Weele, 1909, *Notes Leyden Mus.* **30** : 259 ; id., 1910, *Coll. Zool. Selys.* fasc. **5** (1) : 58, figs. 46, 48 ; pl. 4, fig. 29.

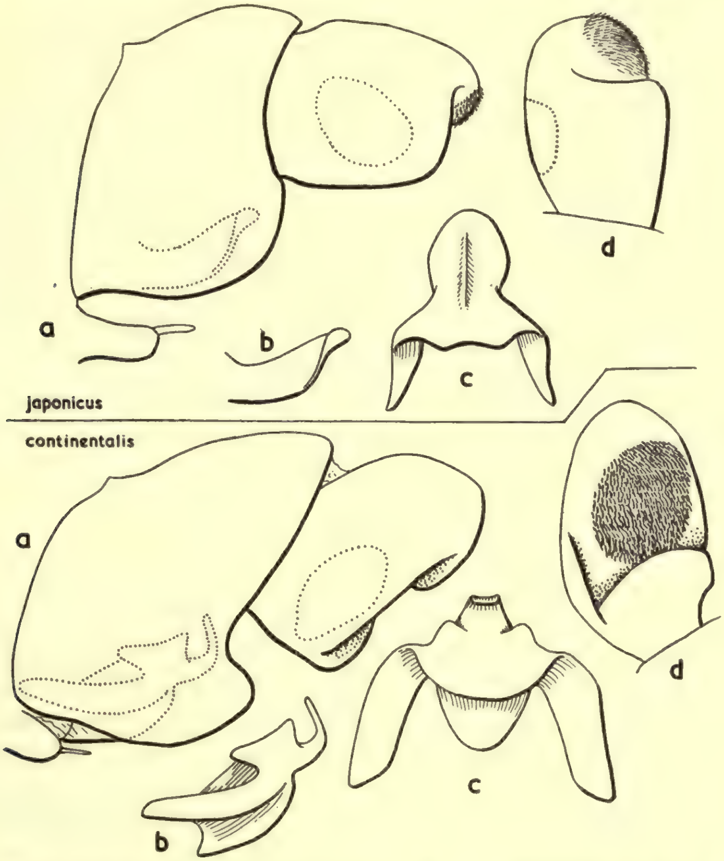

FIG. 12.—*Parachauliodes japonicus* (McLachlan) and *P. continentalis* Weele (holotype). Male genitalia. *a*, lateral ; *b*, aedeagus, lateral ; *c*, aedeagus, dorsal ; *d*, left anal plate, ventral.

♂ GENITALIA. Ninth tergite with its apical margin produced, its centre slightly concave ; lower apical angle produced and rounded, covering the aedeagus in side view. Ninth sternite less sclerotized than eighth, short, broadly rounded, with a small, transparent, triangular lobe projecting beyond its centre. Anal plates stout, longer than deep, each with a shallow, horizontal excision of the apex, dividing it into a rounded upper part and a shallow, right-angled lower lobe. This excision is more noticeable in dried examples. The upper part is armed on its inner surface with black spinules. Aedeagus forming a short, broad tongue, in dorsal view constricted about midway, its apex rounded, scarcely up-turned, and with its lateral margins elevated.

Parachauliodes continentalis Weele

Fig. 12.

Parachauliodes continentalis Weele, 1909, *Notes Leyden Mus.* **30** : 259 ; id., 1910, *Coll. Zool. Selys.* fasc. **5** (1) : 60, fig. 47, pl. 4, fig. 30.

♂ GENITALIA (from holotype). Ninth tergite produced in a rounded hood, from the side with a definite excision of the apical margin below the attachment of the anal plates, the lower apical angle so formed being subtriangular, obscuring the aedeagus. Ninth sternite small, semi-membranous. Anal plates large, from the side obliquely truncate at apex and divided into an upper and a lower portion by a horizontal excision. From beneath, the lower portion is relatively short, about one-third as long as upper, which carries a round area of black spinules on its lower inner surface. The group of trichobothria is situated rather low on the outer surface. Aedeagus short, with divergent, basally directed arms, a pair of triangular lobes on its anterior upper surface, beyond which the apex is produced in a thin, up-curved tongue.

KOREA.

NEOCHAULIODES Weele

Weele, 1909, *Notes Leyden Mus.* **30** : 259 ; id., 1910, *Coll. Zool. Selys,* **5** (1) : 60.

Type species (by designation of Weele, 1910), *Chauliodes sinensis* Walker, 1853.

This genus differs from *Parachauliodes* chiefly in the pectinate antennae of the ♂ (serrate in *Parachauliodes*) and in the simple anal plates, less produced lateral angles of the ninth tergite and the longer aedeagus of the male. The wing venation is variable, some species having the branches of Rs running almost straight to the wing margin, whereas in others (such as the *sinensis* group) some of these branches are sharply curved posteriorly before reaching the margin. I know of no reliable characters by which to separate the females of the two genera and had it not been that the antennal difference in the males is to some extent confirmed by differences in the genital structure, I should have considered the two genera as synonymous.

Sufficient material has not been available to determine to what extent the external genitalia of the female can be relied upon as specific characters. Differences occur in form of the eighth sternite, anal plates and lateral gonapophyses, but in the absence of long series of authentic material, it has been decided to figure the female genitalia of those species only, of which the female is the holotype.

Neochauliodes simplex (Walker)

Fig. 13.

Chauliodes simplex Walker, 1853, *List Neur. Ins. B.M.* : 200.
Neochauliodes simplex (Walker), Weele, 1910, *Coll. Zool. Selys,* **5** (1) : 61, fig. 49 ; pl. 4, fig. 31.

Weele's figure and description of the male genitalia were made from a dried example of Walker's type series. This example, bearing Weele's determination label, has now had the abdomen cleared in KOH solution and new figures and description prepared.

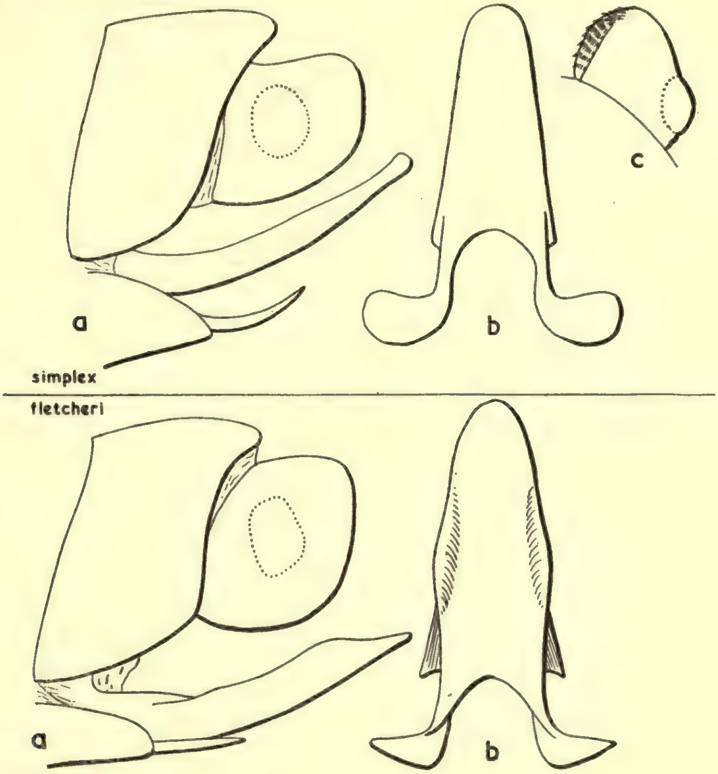

FIG. 13.—*Neochauliodes simplex* (Walker) paratype, and *N. fletcheri* sp. n. holotype. Male genitalia. *a*, lateral ; *b*, aedeagus, dorsal ; *c*, left anal plate, dorsal.

♂ GENITALIA. Apical margin of the ninth tergite convex, sternite broadly rounded, its centre produced in a thin, triangular tongue. Anal plates short and stout, from the side subquadrate, rather longer than deep, with rounded angles, from above ovate, with rows of comb-like teeth on the inner surface. Aedeagus long, spatulate, slightly up-curved, its apex a little dilated in side view. From above it tapers gradually to a broadly rounded apex.

Length of fore wing, ♂ 25–28 mm., ♀ 27–34 mm.

INDIA : Assam, Sylhet, Shillong, Khasi Hills ; United Provinces, Gahrwal.

Neochauliodes fletcheri sp. n.

Fig. 13.

INDIA: Assam, Shillong, 5,000 ft., 26.vi–10.vii.1928 (T. Bainbrigge Fletcher), 3 ♂, 1 ♀ (♂ holotype, 8.vii, ♀ allotype, 30.vi). All in Brit. Mus. (N.H.).

In coloration and markings similar to *N. simplex* (Walker) but rather larger. The chief structural difference is in the male genitalia. The anal plates in side view are deeper than long. The aedeagus is dark reddish brown, from above with the lateral margins slightly sinuous (straight in *simplex*), somewhat convex about midway. From the side the dorsal margins are also more sinuous, tapering to a narrow apex.

Length of fore wing: ♂ 30–32 mm., ♀ 38 mm.

Holotype with abdomen mounted in canada balsam.

Neochauliodes indicus (Weele)

Fig. 14.

Chauliodes indicus Weele, 1907, *Notes Leyden Mus.* **28**: 255, figs. 21–22, pl. 4, fig. 3.
Neochauliodes indicus Weele, 1910, *Coll. Zool. Selys.* **5** (1): 62.

The specimen here dealt with agrees quite well with Weele's general description and figure of the wings, but there are differences in male genitalia. These may be specific, but after consideration of other instances it is considered that the differences are not more than might be expected in comparing cleared preparations with dried material.

♂ GENITALIA. Apical margin of ninth tergite straight or slightly concave, somewhat depressed at its centre. Ninth sternite moderately short, broad, the centre of its apical margin produced in a transparent, triangular lobe. Anal plates stout, subquadrate from the side, apical margin widely but shallowly excised, so that the apical angles are unusually pronounced. From above the anal plate is thick, its apex truncate, inner surface set with rows of black spinules. Aedeagus broad at base, tapering to a rather narrow, spatulate apex. From the side it is up-curved, stout basally, apex thin and ligulate.

The chief differences between this example and Weele's figure lie in the excised, less obliquely truncate apex of the anal plate and the rather broader apex of the aedeagus. The specimen from which the above description was taken is labelled Sikkim, Gopaldhara, Rongbong Valley, H. Stevens, and I have also seen a female from Darjeeling and another from the Khasi Hills.

Neochauliodes tonkinensis (Weele)

Fig. 14.

Chauliodes tonkinensis Weele, 1907, *Notes Leyden Mus.* **28**: 260, pl. 5, fig. 3.
Neochauliodes tonkinensis Weele, 1910, *Coll. Zool. Selys*, **5** (1): 67, fig. 51.

In the McLachlan Collection are one male and two females from the Ruby Mines district of Burma, which I believe to be Weele's *tonkinensis* (described from a female).

The two females at present under discussion differ somewhat in size (fore wing, 39–50 mm.), and the smaller one and also the male have the wing pattern somewhat resembling *indicus* but with the basal half of the fore wing heavily spotted. The costal area is also heavily spotted and for part of its length has two rows of spots. In the larger female the contrast between the spots and the wing membrane in the distal half of the wings is much greater.

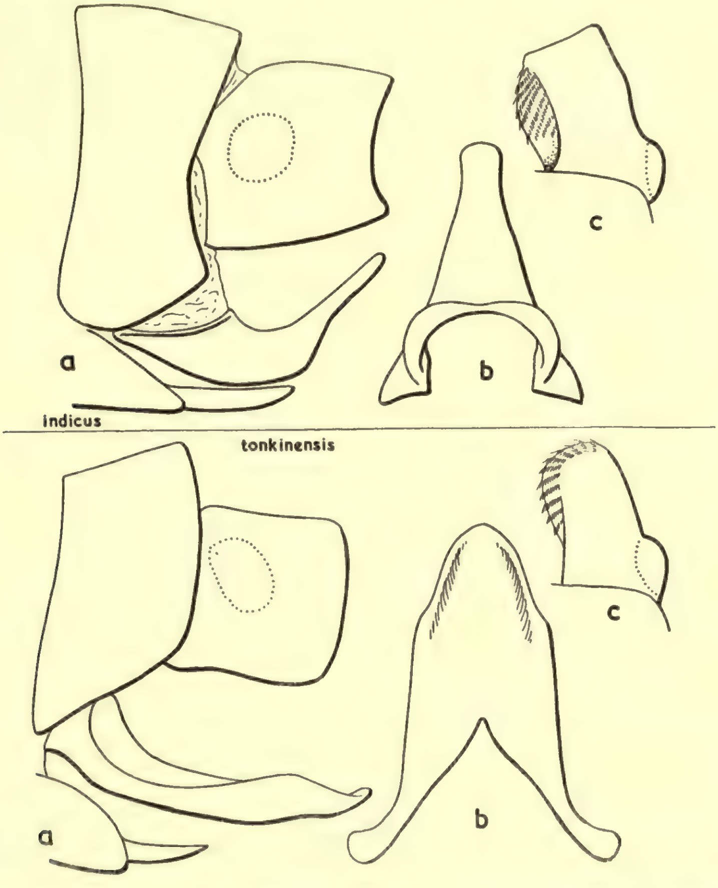

FIG. 14.—*Neochauliodes indicus* (Weele) and *N. tonkinensis* (Weele). Male genitalia. *a*, lateral; *b*, aedeagus, dorsal; *c*, left anal plate, dorsal.

♂ GENITALIA. Ninth tergite with apical margin truncate, sternite semi-membranous, forming a short, broad subgenital plate, very slightly excised at its centre, its sides a little concave. Anal plates quadrate from the side, inner apical angle bearing rows of short, comb-like teeth. Aedeagus about twice as long as broad, tapering to a rounded apex in distal half, lateral margins in this area slightly elevated.

Length of fore wing: ♂ 39 mm., ♀ 39–50 mm.

Neochauliodes umbratus sp. n.

Fig. 15.

INDO-CHINA: A. Vuillet, 1 ♂, holotype, in Brit. Mus. (N.H.).

Head dark fuscous, labrum and occiput reddish brown, antennae piceous. Pronotum orange-brown, meso- and meta-nota, legs and abdomen fuscous. Fore wing extensively clouded with fuscous, leaving two indefinite, hyaline bands running obliquely basad from the costal margin, one midway and the other in the apical third. Pterostigma dark brown, long, interrupted by a cream band. Venation brownish, costal cross-veins bordered with fuscous. Hind wing mainly hyaline, with a fuscous cloud at apex and another just beyond the middle, not reaching to the posterior margin.

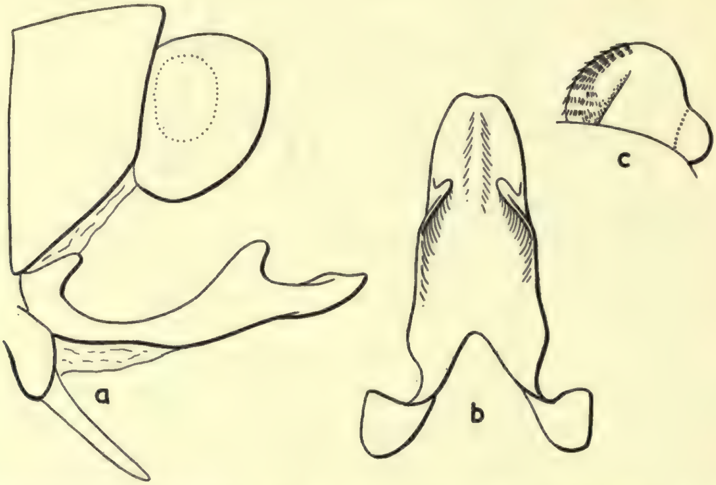

FIG. 15.—*Neochauliodes umbratus* sp. n. (holotype). Male genitalia. *a*, lateral; *b*, aedeagus, dorsal; *c*, left anal plate, dorsal.

♂ GENITALIA. Ninth tergite only slightly produced apically, from the side with lower apical angle very obtuse. Ninth sternite short and broad, its apical margin produced in a lightly sclerotized, thin, triangular lobe or tongue, clothed in microscopic setae. Anal plates globose, short, inner surface with the usual comb-like teeth. From the side the anal plate is ovate, upper margin flattened. Aedeagus elongate, narrow, its lateral margins sinuate and subparallel, and with a rounded, apico-dorsally directed lobe on each side, situated at about one third before the apex, which is shallowly excised.

Length of fore wing, 33 mm.

Type with abdomen mounted in canada balsam. *N. umbratus* may be easily distinguished from the *sinensis* group by the presence of lateral lobes of the aedeagus. These lobes are more apically directed than in *N. bowringi*, to which it is closely related in genital structure.

Neochauliodes bowringi (McLachlan)

Fig. 16.

Hermes sinensis Walker, 1853, *List. Neur. Ins. B.M.* : 203 (nom. preocc.).
Chauliodes sinensis Brauer, 1865 (*nec* Walker, 1853), *Reise Novara*, **1** : 102.
Chauliodes bowringi McLachlan, 1867, *J. Linn. Soc. Zool.* **9** : 260 ; Weele, 1907, *Notes Leyden Mus.* **28** : 259, figs. 23–24 ; pl. 5, fig. 2.
Neochauliodes bowringi (McLachlan) Weele, 1910, *Coll. Zool. Selys*, **5** (1) : 66.

♀ GENITALIA (holotype). Eighth sternite sclerotized, apical margin produced in a parabolic subgenital plate. Ninth tergite sclerotized, short and deep. Lateral gonapophyses as large as anal plates, flattened laterally, quadrate, directed upwards. Anal plates stout, parallel-sided, then abruptly tapered to an acute apex.

CHINA : Hong Kong.

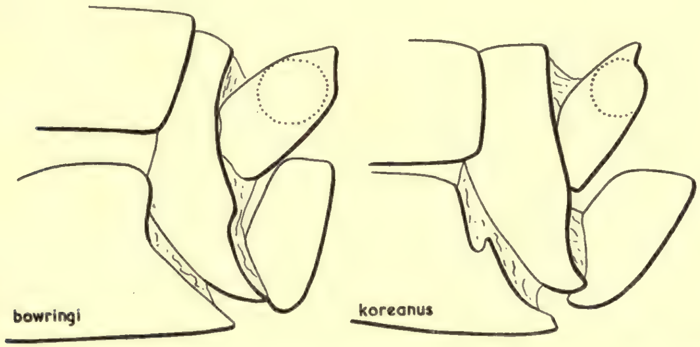

FIG. 16.—*Neochauliodes bowringi* (McLachlan) and *N. koreanus* Weele. Female genitalia, lateral, of holotypes.

Neochauliodes koreanus Weele

Fig. 16.

Neochauliodes koreanus Weele, 1909, *Notes Leyden Mus.* **30** : 261 ; id., 1910, *Coll. Zool. Selys.* **5** (1) : 65, pl. 4, fig. 39.

This opportunity is taken to call attention to two errors in the published locality data of this species. In his original description, Weele writes " Two females from Korea (the types) are in the British Museum." In his Selysian monograph he alters this (without comment) to one female from Korea, Seoul, and one from Hong Kong. The Korean example, which is here designated *holotype*, bears an additional label (quoted by Weele) " Hong Kong Peak, Happy Valley." I feel sure that this is an error and that this label should in fact belong to the Hong Kong example, which incidentally is the one figured by Weele on plate 4.

♀ GENITALIA. Eighth sternite parabolically produced apically. Lateral gonapophyses of ninth sternite foliate, from side with upper margin obtusely angled, lower slightly convex, apex acutely rounded. Anal plates parallel-sided, lower margin excised before the apex.

In the British Museum there is a second example labelled Hong Kong, from the McLachlan Collection, in which the wings are even more heavily suffused with fuscous.

Neochauliodes sinensis occidentalis Weele

Figs. 17, 18.

Chauliodes sinensis (Walker) Weele, 1907, *Notes Leyden Mus.* **28** : 262 (partim).
Neochauliodes sinensis occidentalis Weele, 1909, *Notes Leyden Mus.* **30** : 260 ; id. 1910, *Coll. Zool. Selys.* **5** (1) : 64, pl. 4, fig. 40.

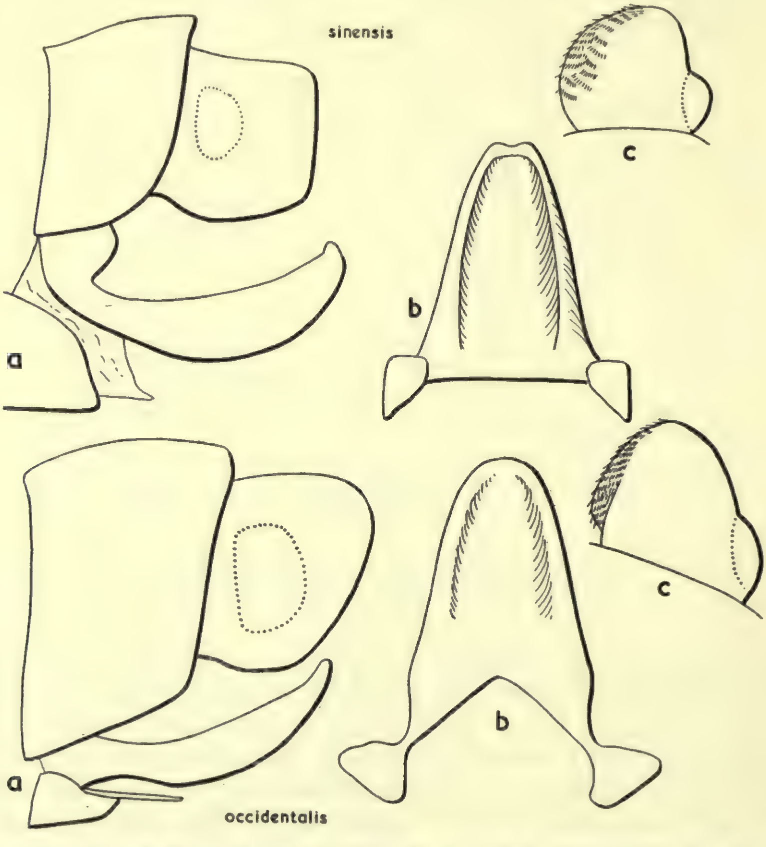

Fig. 17.—*Neochauliodes sinensis sinensis* (Walker) and *N.s. occidentalis* Weele, holotypes. Male genitalia. *a*, lateral ; *b*, aedeagus, dorsal ; *c*, left anal plate, dorsal.

♂ GENITALIA (holotype). Closely resembling those of *N. s. sinensis* (Walker) but differing as follows : Anal plates from the side with apical angles more rounded, apical margin obliquely convex. From above they are rather more pointed. Aedeagus from the side more slender, from above somewhat constricted basally, apex rounded, not excised. Ninth sternite shorter, with a triangular membranous tongue at its apex.

♀ GENITALIA (allotype). Eighth sternite produced in a subgenital plate, moderately pointed apically in side view. Lateral gonapophyses rather small, shorter than anal plates, flattened and pointed apically. Anal plates rhomboidal in side view, stout in dorsal view, the group of trichobothria almost ventral, not visible from above.

Very closely allied to *sinensis* Walker and probably correctly considered by Weele as a subspecies of it. No holotype appears to have been selected from the type series, and I therefore designate the male in the British Museum (N.H.), with abdomen now mounted in canada balsam, and the female in the same collection as *holotype* and *allotype* respectively. Two other males in the same collection (and the series in the Berlin Museum, not seen by me) become paratypes. The above specimens are all from Omei Shan, Szechwan. In the British Museum (N.H.) are two further males from N. W. CHINA (ex McLachlan collection) which agree in wing pattern with the types. Also in the British Museum are a male and female from W. CHINA, Chin-Fu-San, and a male from TONKIN, Ngai-Tio, which differ considerably in wing markings and which may represent two further subspecies of *sinensis*. The male genitalia, however, show only slight comparative differences from *N.s. occidentalis* and it seems wiser therefore to leave them undescribed until more abundant material is available.

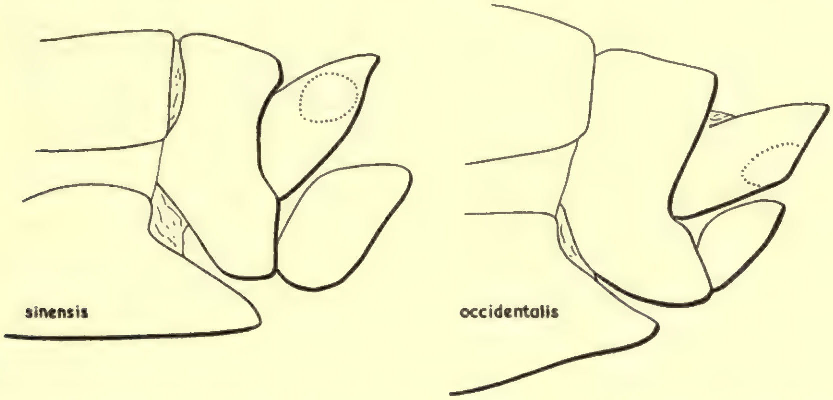

FIG. 18.—*Neochauliodes sinensis sinensis* (Walker) and *N.s. occidentalis* Weele (allotype). Female genitalia, lateral.

Neochauliodes sinensis sinensis (Walker)

Figs. 17, 18.

Chauliodes sinensis Walker, 1853, *List. Neur. Ins. B.M.* : 199 ; Weele, 1907, *Notes Leyden Mus.* **28** : 261, figs. 25–26.
Neochauliodes sinensis (Walker) Weele, 1910, *Coll. Zool. Selys.* **5** (1) : 63.

♂ GENITALIA (holotype). Ninth tergite with apical margin slightly produced, rather more sclerotized than sternite. The latter is semi-membranous, like the other segments, forming a short, wide subgenital plate, apical margin slightly excised and projecting beyond it is a triangular, membranous lobe. Anal plates short, quadrate from the side, more or less globular from above. The inner surface is set with black spinules, arranged in short, curved, comb-like rows. Aedeagus large, strongly sclerotized, forming an elongate, tapering scoop or tongue, up-curved from the side, its apex shallowly notched.

♀ GENITALIA (MONGOLIA, McLachlan Collection). Eighth sternite with its apical margin produced in a subgenital plate. Ninth tergite short and deep, lightly sclerotized, its apical part membranous. Lateral gonapophyses foliate, semi-membranous, lightly sclerotized and pigmented basally. Anal plates a little larger than gonapophyses, narrow from above, tapering to an acute apex from the side.

The genitalia of the type differ from those figured by Weele (1907) in the form of the aedeagus, which is less dilated apically from the side, and less sharply angled upwards. In dorsal view the lateral margins are evenly convex in apical half, not sinuous. It is possible that these differences may be due to the fact that the present figures have been made after clearing the genitalia in KOH solution.

Neochauliodes sinensis truncatus ssp. n.

Fig. 19.

INDIA: Assam, Khasi Hills, Shillong, 5,000 ft., 13–15.vi.1928 (T. Bainbrigge Fletcher), holotype ♂, allotype ♀ and 1 ♀ paratype, all in Brit. Mus. (N.H.).

General appearance much as in the typical *sinensis* but in the fore wing the oblique, transverse band is largely broken into rounded dots. The head, particularly in the female, is distinctly darker and browner than the orange pronotum.

♂ GENITALIA. Ninth tergite with its apical margin scarcely produced, rather more sclerotized than the sternite, which forms a short, wide, semi-membranous subgenital plate, apical margin parabolic, and with a triangular, membranous lobe projecting beyond its apex. Anal plates short, stout, apical margin rounded in lateral and dorsal views, its inner apical surface set with rows of black, comb-like spines. Aedeagus strongly sclerotized, large, forming a broad, up-curved plate. From above it tapers but slightly to a wide, truncate apex with rounded angles.

♀ GENITALIA. Eighth sternite produced apically in a broad, shallow, truncated triangle, angles rounded, sides slightly concave. Ninth tergite moderately sclerotized. Lateral gonapophyses flattened, broadly pyriform in side view. Anal plates about as long as gonapophyses, in side view with lower margin straight, upper convex, apex rounded. Trichobothria placed laterally.

Length of fore wing: ♂ 33 mm.; ♀ 37–44 mm.

The male genitalia are of the *sinensis* pattern but differ from the typical subspecies in the more rounded anal plates and the wider, truncate apex of the aedeagus.

Protochauliodes reedi sp. n.

Figs. 20, 21.

S. AMERICA: Chili (Reed), 5 ♂, 1 ♀ (Calvert), 1 ♂, 2 ♀. Holotype ♂ (Reed, with abdomen mounted in canada balsam and left wings between celluloid), allotype ♀ (Calvert) and paratypes in Brit. Mus. (N.H.).

Body fuscous: labrum and clypeus fulvous, mandibles fulvous basally, reddish brown apically. A piceous area around the ocelli, a fulvous spot between the antennae, and back of head marked with fulvous. Antennae dark castaneous basally, shading to fuscous apically. Thorax with obscure fulvous markings. Wings greyish hyaline, venation brownish. Fore wing with the veins heavily

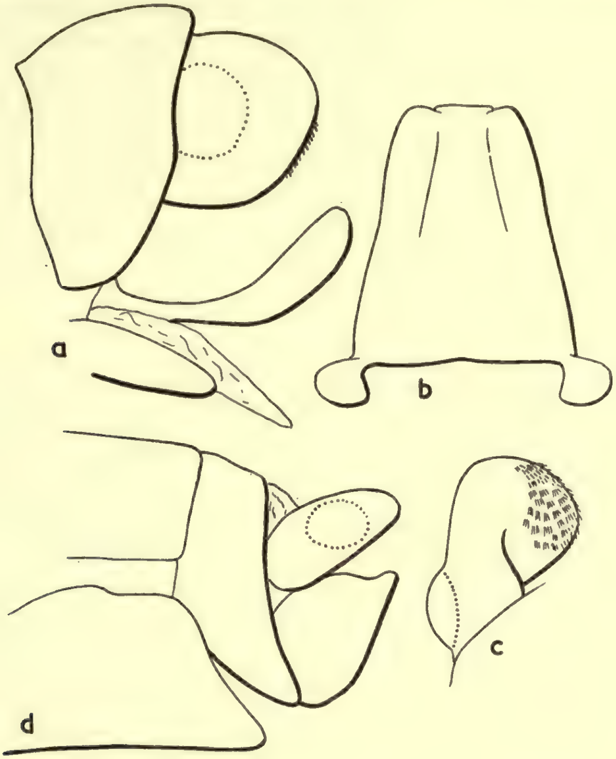

FIG. 19.—*Neochauliodes sinensis truncatus* ssp. n. Genitalia. *a–c*, male. *a*, lateral; *b*, aedeagus, dorsal; *c*, right anal plate, dorsal; *d*, female, lateral.

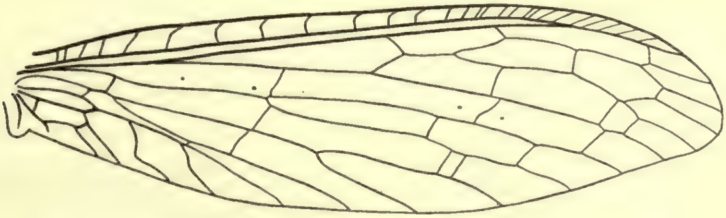

FIG. 20.—*Protochauliodes reedi* sp. n. Male, anterior wing.

bordered with brownish dots or short, divergent fasciae, especially along the radius and its sector and at the pterostigma. The centres of the cells are lightly clouded with a darker grey, but not usually reaching the marginal dots. The attachments of the wings fuscous, not orange. Venation much as in *P. cinerascens*, but in the fore wing most of the costal cross-veins are distinctly angled distad.

♂ GENITALIA. Ninth sternite triangularly produced at centre of apical margin, beyond rounded shoulders. Anal plates stout, slightly dilated apically and truncate or slightly emarginate, with rounded angles in side view, curving inwards in dorsal aspect. Aedeagus with a broad, arched base, subquadrate in dorsal aspect, its apex with a triangular excision between two rounded lobes. There are two raised, divergent ridges or lobes on the upper surface about midway, curving backward and leaving a wide excision between them. From the side the apical lobes curve slightly upwards and the median ridges appear as triangular elevations.

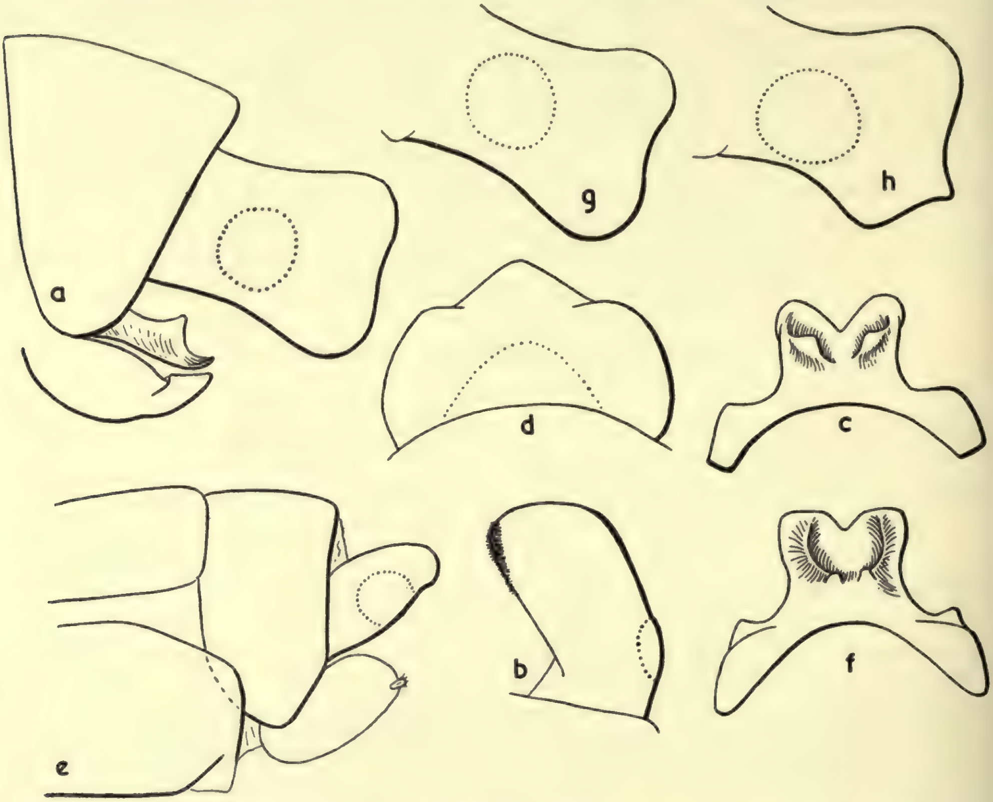

FIG. 21.—*Protochauliodes reedi* sp. n., *a–e* and *P. cinerascens* (Blanchard), *f–h*. Genitalia. *a*, male, lateral; *b*, male left anal plate, dorsal; *c*, aedeagus, dorsal; *d*, male ninth sternite, ventral; *e*, female, lateral; *f*, aedaegus, dorsal; *g*, male anal plate, lateral; *h*, male anal plate, lateral, from another example.

♀ GENITALIA. Eighth sternite pigmented and sclerotized, a triangular area at centre of apical margin semi-membranous. Ninth tergite deep, lateral gonapophyses stout, laterally compressed, extending beyond the tergite for about one-third of its length, basal two-thirds pigmented, apical third membranous and carrying a very small cercus. Anal plates finger-shaped, about as long as lateral gonapophyses, apices rounded.

Length of fore wing : ♂ 35–39 mm. ; ♀ 41–47 mm.

This species is closely allied to *P. cinerascens* (Blanchard) but differs from it in the pattern of the wings, angled costal cross-veins of fore wings, fuscous wing bases, the form of the aedeagus in the male and the rounded anal plates of the female. My interpretation of *P. cinerascens* is based upon the male in the British Museum (Nat. Hist.), described and figured by Weele in *Coll. Zool. Selys*, **5** (1) : 49–50, figs. 35–36, pl. 3, fig. 23. The form of the anal plates appears to be variable in *cinerascens*, one example having the lower angle produced and with a small point. It is possibly a little more clavate apically but does not offer any good characters by which the dried insects may be separated. In *cinerascens* the aedeagus has its apex divided into two truncate lobes, separated by an acute excision, and the mid-dorsal lobes or ridges are much smaller.

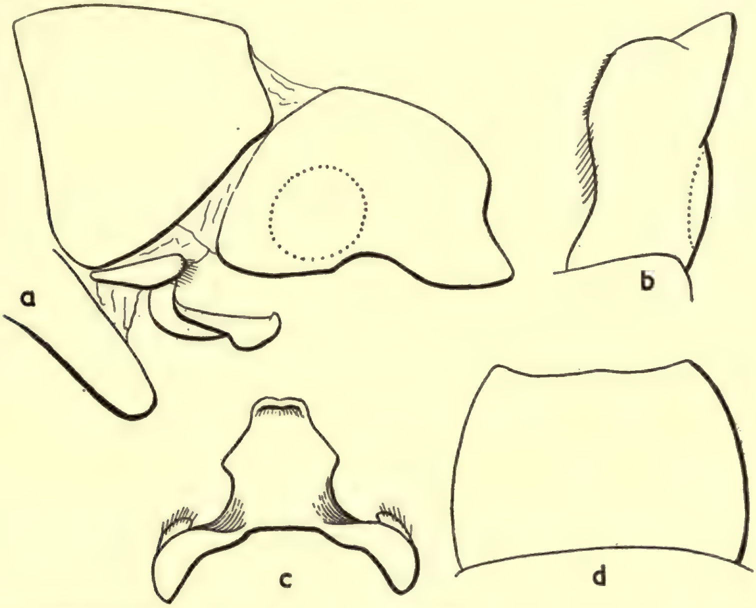

FIG. 22.—*Protochauliodes biconicus* sp. n. Male genitalia. *a*, lateral ; *b*, left anal plate, dorsal ; *c*, aedeagus, dorsal ; *d*, ninth sternite, ventral.

Protochauliodes biconicus sp. n.

Fig. 22.

AUSTRALIA : New South Wales, Nowra, 8.x.1928 (F. A. Rodway), 1 ♂, holotype, in Brit. Mus. (N.H.).

The unique male is somewhat damaged, one antenna and part of the other missing, and the base of the right-hand wings defective. Body-colour dull reddish brown, head with paler markings on labrum, clypeus, between antennae and on vertex. Antennae subserrate, the anterior margin of each segment somewhat dilated, mainly fuscous. Pronotum anteriorly orange-fulvous. Legs fuscous. Wings with membrane pale brownish hyaline, fore wing with scattered brownish spots, darkest along costal border; hind wing with a few spots apically and along costal border. Venation brown, arrangement of veins much as in *P. cinerascens* (Blanchard).

♂ GENITALIA. Ninth tergite with apical margin widely and shallowly excised. Ninth sternite rather broad, lateral margins convex, apex truncate or slightly sinuous. Anal plates stout, from the side with upper margin convex, lower sinuous, lower apical angle produced, short and conical. From above this cone is directed backward and slightly outward. Inner margin sinuous, armed with dense, fine spinules and longer hairs. Aedeagus forming a subtriangular plate, lateral margins excised basally, apex very slightly bilobed. From the side the aedeagus is abruptly angled downwards near its base, then curved tailward to a moderately dilated apex with a small, acute projection on its upper surface.

Length of fore wing, 32 mm.

Type with abdomen mounted in balsam. This is, I believe, the first *Protochauliodes* to be recorded from Australia. Until the type locality of *Chauliodes dubitatus* Walker is known, one must not overlook the possibility that the present species may be the male of *dubitatus*. It differs however in its narrower wings, different pattern and the fact that in *dubitatus* the basal *r–m* cross-vein in the hind wing is completely absent. From *P. cinerascens* it may be separated by the differently shaped anal plates and by the form of the aedeagus.

APPENDIX

Since the galley-proofs of this paper were corrected, I have seen a copy of Mr. E. F. Riek's paper ("Australian Megaloptera, or Alder-flies," 1954, *Austral. Journ. Zool.* **2** (1): 131–142, 1 pl., 3 text-figs.). It seems probable that some of the new species described in the present paper will prove to be the same as species of *Archichauliodes* described by Riek, but in the absence of genitalia figures of his species it must be left for Australian entomologists to decide the matter. His *Austrochauliodes dubitatus* (Walker) may well be the same as my *Protochauliodes biconicus*, but his photograph of the female wings shows a definite basal *r–m* cross-vein in the hind wing, which is lacking in the type of *dubitatus* Walker.

D. E. KIMMINS,
6th Sept., 1954.

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N. C. E. MILLER

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Pp. 445–488; 21 *Text-figures.*

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THE GENERA *HENRICOHAHNIA* BREDDIN, *DICROTELUS* ERICHSON, *NYLLIUS* STÅL, *ORGETORIXA* CHINA AND ALLIED NEW GENERA

(HEMIPTERA-HETEROPTERA, REDUVIIDAE, HARPACTORINAE, DICROTELINI)

By N. C. E. MILLER, F.R.E.S., F.Z.S., F.E.S.S.A.
(Commonwealth Institute of Entomology, London)

SYNOPSIS

This paper contains a revision of the genus *Henricohahnia* Breddin, descriptions of new allied genera, also descriptions and figures of the genus *Nyllius* Stål, new genera allied to it and new species of *Orgetorixa* China.

THE genus *Henricohahnia* was erected by Breddin in 1900 (*Deutsche ent. Zeit.*: 184–185) for the reception of a somewhat bizarre reduviid from the Tengger Mountains of East Java. He gave it the specific name of *wahnschaffei*.

In 1903 Distant erected the genus *Forestus* (*Ann. Mag. Nat. Hist.* **12** : 251–253) and placed in it four species—*typicus*, *montanus*, *spinosus* and *inermis* but, in 1904 (*Fauna Brit. India. Rhynchota* **2** : 389) he transferred them to *Henricohahnia*. In the same year and publication (*loc. cit.*) he described a new species—*Henricohahnia gallus*—and in 1909 another new species—*H. badgleyi* (*Ann. Soc. ent. Belg.* **53** : 373).

A critical examination of the species described by Distant, however, has revealed that the species *inermis* and *badgleyi* should not have been placed in *Henricohahnia*. Accordingly I have erected a new genus—*Karenocoris*—for them.

In the present paper I have also described two more new allied genera—*Tapirocoris* and *Malaiseana*—both of which are allied to *Henricohahnia*.

I have revised all previous descriptions of *Henricohahnia* species with the exception of that of *wahnschaffei* which is given in the original. A few remarks supplementary to Breddin's generic description, however, are added.

All species are figured for the first time except *Henricohahnia typica* (Distant).

All the known genera in the Dicrotelini are keyed on pages 466 and 474.

Nothing appears to be known about the ecology of *Henricohahnia* or of any of the other new genera described herein, but it is probable, to judge by their habitus, that they pass some portion of their lives under the loose bark of dead trees.

The types and paratypes of all the new species are in the British Museum (Natural

History) with the exception of the type and paratype of *Neonyllius echinus* gen. et sp. n., which are in the Vienna Museum.

For the genera *Nyllius* and *Dicrotelus*, Stål proposed the tribal name of Dicrotelini (1859, *Öfv. Vet. Ak. Förh.* **16** (8) : 366). To this tribe I consider that the genera *Neonyllius* gen. nov., *Paranyllius* gen. nov., *Orgetorixa* China, and *Henricohahnia* Breddin also belong.

I express my thanks to Dr. Stevan Kéler of the Zoological Museum Berlin, for his kindness in allowing me to examine the types of *Dicrotelus prolixus* Erichson and *Nyllius asperatus* Stål. I am also indebted to Dr. W. E. China of the British Museum (Nat. Hist.) for his assistance in elucidating the synonymy of *Sphagiastes* Stål.

Henricohahnia Breddin

Henricohahnia Breddin, 1900, *Deutsche ent. Zeit.* : 184–185.

Forestus Distant, 1903, *Ann. Mag. Nat. Hist.* (12) ; 251–253, type *F. typicus* Distant ; Distant, 1904, *Fauna Brit. India, Rhynchota*, **2**, 389 ; Distant, 1909, *Ann. Soc. ent. Belg.* **53** : 373.

Capite a supero viso longe cylindrico, pronoto fere aequilongo, antrorsum in processum compressum angustum, a latere viso acutangularem longe prominente ; capite postoculari quam parte anteoculari cum oculis ipsis nonnihil longiore, retrorsum levissime angustato ; capitis impressione superiore pone oculos minusculos obsoleta, fere nulla, ocellis punctiformibus ab oculis sat remotis. Capite supra granulis paucis setigeris, haud tamen spinulis instructo, infra utrimque spinulis paucis seriatis armato. Rostri articulo basali marginem posticum oculorum haud attingente, quam articulo secundo plus duplo breviore. Antennis breviusculis, capite pronotoque simul sumptis brevioribus, dimorphis ; articulo primo subclavato capite postoculari multo breviore et articulis secundo tertioque singulis in ♂ breviore, in ♀ subaequilongo ; primo tuberculis compressis et obtusatis sublobiformibus horrente, secundo in ♀ supra paucis eiusmodo dentibus armato, in ♂ inermi, piloso. Antepronoto tuberculis nonnullis acutiusculis, post-pronoto granulis sparsis armatis, pone humeros retrorsum sat longe producto. Scutelli apice sat angusto. Hemelytrorum areola discali valde elongata atque angusta. Membranae area interiore valde parva, quam area exteriore basi ter angustiore eademque area duplo breviore ; area exteriore retrorsum distincte dilatata. Abdominis marginibus in lobos mediocres dilatatis. Prostethio in sulci lateribus utrimque tuberculis nonnullis, mesostethio antice latera versus nodulo distincto armatis. Ventre medio subtiliter carinato. Femoribus quam tibiis multo longioribus, anterioribus subincrassatis. Femoribus omnibus supra et extus spinulis fortibus numerosis seriatis, anterioribus subtus serie unica subobliqua spinularum paucarum armatis. Tibiis anterioribus supra spinulis crassis nonnullis minoribus, anticis subtus paucis maioribus instructis.

Breddin omits to mention in his generic description that the coxae and trochanters are spinose and that the basal areas of the membranal cells are more or less coriaceous.

At the conclusion of his description of the genus, Breddin adds : "*genus singulare inter Blaptonem et Sclominam ordinandum.*" However, I consider the relationship of *Henricohahnia* to these two genera to be very remote, for the following reasons. In *Sclomina* Stål (1861, *Ent. Zeit. Stett.* **22** : 137) all segments of the antennae are slender and the basal segment is approximately twice as long as the head, the rostrum is more or less curved (as in the majority of the Harpactorinae), the head is not cylindrical, the transverse sulcus is deep and wide and the vertex is not produced anteriorly. The spines on the head in *Sclomina* are long and slender. The pronotum has long slender spines and the posterior margin of the posterior lobe is almost straight. In the hemelytra the internal cell of the membrane is about two-thirds as long and one-third wider than the external cell and the venation of the corium is different in having a small, triangular cell adjacent to the discal cell.

Blapton was established by Spinola in 1850 (*separata* from *Mem. Matem. fisica, Soc. ital. Sci.* **25** (1), 1852, 88 and 144).

Spinola states that "ha per tipo una specie di Cayenna discritta dai Signori Amyot e Serville, vedi *Hist. des Hemypt.* 376, 113, *Sinea punctipes* Amyot e Serville." The type-species of the genus *Blapton* Spinola, 1850, is thus, undoubtedly, *Sinea punctipes* Amyot & Serville, 1843. But this S. American species is congeneric with the Brazilian *Milyas ornaticeps* Stål, 1858, which is the type species of the genus *Milyas* Stål, 1858, which, because it was preoccupied, was re-named *Pselliopus* by Bergroth (1905, *Rev. Ent.*, : 112). *Blapton* Spinola, 1850, thus has priority over *Pselliopus* Bergroth, 1905, and the South African genus *Blapton auctt.* nec Spinola takes the next available name, which is *Sphagiastes* Stål (1853, *Öfv. Vet. Ak. Förh.* : 43), type *S. horrificus* 1853 = *ramentaceus* Germar, 1837 = *dregei* Spinola, 1850.

There is one other species which has been placed in the genus *Blapton*, namely *Arilus pilipes* Stål (1855, *Öfv. Vet. Ak. Förh.* : 43). In 1912 Schouteden (*Rev. Zool. afr.* **2** : 114) considered that *B. pilipes* should be placed, at least, in a sub-genus of *Blapton* for which he proposed the name *Lepton*. In 1913 (*loc. cit.* : 437), having discovered that *Lepton* was preoccupied, Schouteden substituted the name *Lerton*. This genus is allied to, but is not a subgenus of *Sphagiastes*.

The affinity of *Henricohahnia* to *Sphagiastes* is remote. There is a slight similarity in the shape of the head and rostrum, but the armature of the head, the extraordinary spinose pronotum, particularly its posterior lobe, the unique structure of the connexivum and the tuberculate ventral surface of the abdomen, all indicate that these two genera are by no means closely related. Furthermore, in *Sphagiastes* the antennal segments and legs are slender and have compact tufts of short thick setae as well as normal setae. The abdomen in *Sphagiastes* is not carinate mid-ventrally, the membranal cells are more or less equal in area and the membrane has irregularly ramate veins apically.

Henricohahnia, I think, is allied to *Nyllius* Stål (1859, *Öfv. Vet. Ak. Förh.* **16** (8) : 355) and to *Orgetorixa* China (1925, *Ann. Mag. Nat. Hist.* (9) **15** : 486–488) with which it has the following characters in common, namely the produced vertex, more or less cylindrical head, tuberculate and spinose pronotum with the posterior margin medially excavate.

Dicrotelus Erichson (1842, *Arch.* **8** (1) : 284) has certain affinities with these three genera but differs in having a slender habitus, a smooth integument and non-tuberculate connexivum and also in being brachypterous.

The venation of the hemelytra of *Henricohahnia* and *Nyllius* differs from that of *Orgetorixa* in having a relatively small but distinct internal membranal cell which *Orgetorixa* lacks. The presence, absence, or size of this cell, however, may not be of great importance, since it appears to vary somewhat and may be absent in individuals of species in which it is normally present. For example, the cell was absent from a paratype of *Nyllius asperatus* which I examined.

Key to *Henricohahnia* species

1. Humeral angles strongly spinously or conically produced . . . . . . 4.
–. Humeral angles not or hardly at all produced . . . . 2.
2. Head and pronotum without black pattern . . . . *indica* sp. n.
–. Head and pronotum with black pattern . . . . 3.
3. Produced portion of vertex acute apically in lateral view . . . . *vitticeps* sp. n.
–. Produced portion of vertex broadly rounded apically in lateral view . *gallus* Distant
4. Humeral angles spinous . . . . 5.
–. Humeral angles conical, thick, strongly recurved . . . . 6.
5. Posterior margin of posterior pronotal lobe narrowly and deeply incised medially *cauta* sp. n.
–. Posterior margin of posterior pronotal lobe widely and shallowly incised medially *typica* (Distant).
6. Produced portion of vertex truncate apically in lateral view . . . . . . 7.
–. Produced portion of vertex rounded apically in lateral view . . . . . . 8.
7. Spines at humeral angles truncate apically . . . . *vittata* sp. n.
–. Spines at humeral angles sub-acute apically . . . . 9.
8. Posterior margin of posterior pronotal lobe undulate with moderately deep and wide median incision . . . . *montana* (Distant)
–. Posterior margin of posterior pronotal lobe undulate with very shallow median incision . . . . *wahnschaffei* Breddin.
9. Posterior margin of posterior pronotal lobe undulate with very wide, shallow median incision . . . . *spinosa* (Distant)
–. Posterior margin of posterior pronotal lobe regularly undulate . . *tinctoria* sp. n.

Henricohahnia wahnschaffei Breddin

(Fig. 1)

Deutsche ent. Zeit. **1900** : 184–185.

Colour : *Ferruginescenti vel fuscescenti-cinerea, griseo pilosa tomentoque cinereo dense induta. Rostri apice, spinulis gulae, antennarum articulo primo apicem versus quartoque toto nec non femoribus supra tibiarumque maxima parte, ut videtur semper, nigris vel nigricantibus. Rostri articuli primi apice secundoque toto, tibiarum annulo distincto medio alioque subbasali obsoletiore, tarsis articulorum antennarum secundi et tertii parte basali quartique ima basi ferruginescenti-albidis.*

Structure : *Capite infra pone oculos spinulis utrimque binis juxtapositis et basin versus tuberculis utrimque singulis armato. Post-pronoto basi late sinuato vel apertangulariter exciso ; antice carinis duobus et magis extrorsum lineis utrimque singulis dense pilosis longitudinalibus, omnibus retrorsum divergentibus, inter humeros carinula utrimque transversali ex angulo humerali exeunte et intus mox evanescente instructo ; hoc angulo sublobiformiter prominulo, spina extrorsum et valde retrorsum producta armato. Tuberculis spiniformibus femorum in series quatuor vel quinque ordinatis, anterioribus praeterea subtus spinis tribus vel quatuor armatis. Tibiis anticis subtus apicem versus spina forti ceterisque longiore calcariformi nonnihil extrorsum directa munitis. Abdomen in mare hemelytris clausis non multo in femina multo latiore, rhomboideo. Apice segmenti sexti connexivalis cum basi septimi in lobum apertangularem, apice segmenti quinti cum ima basi sexti in lobum mediocrem (in mare irregulariter quadrangularem postice extus acuminatum, in femina trapezoideum apice truncatum) dilatis, in femina angulo apicali segmenti etiam quarti apertangulariter extrorsum prominente. Abdominis margine toto tuberculis minutis setiferis, ventre connexivoque granulis sparsis instructis.*

The measurements given by Breddin, are total length, 13–15·5 mm. ; greatest pronotal width, 4–4·75 mm.

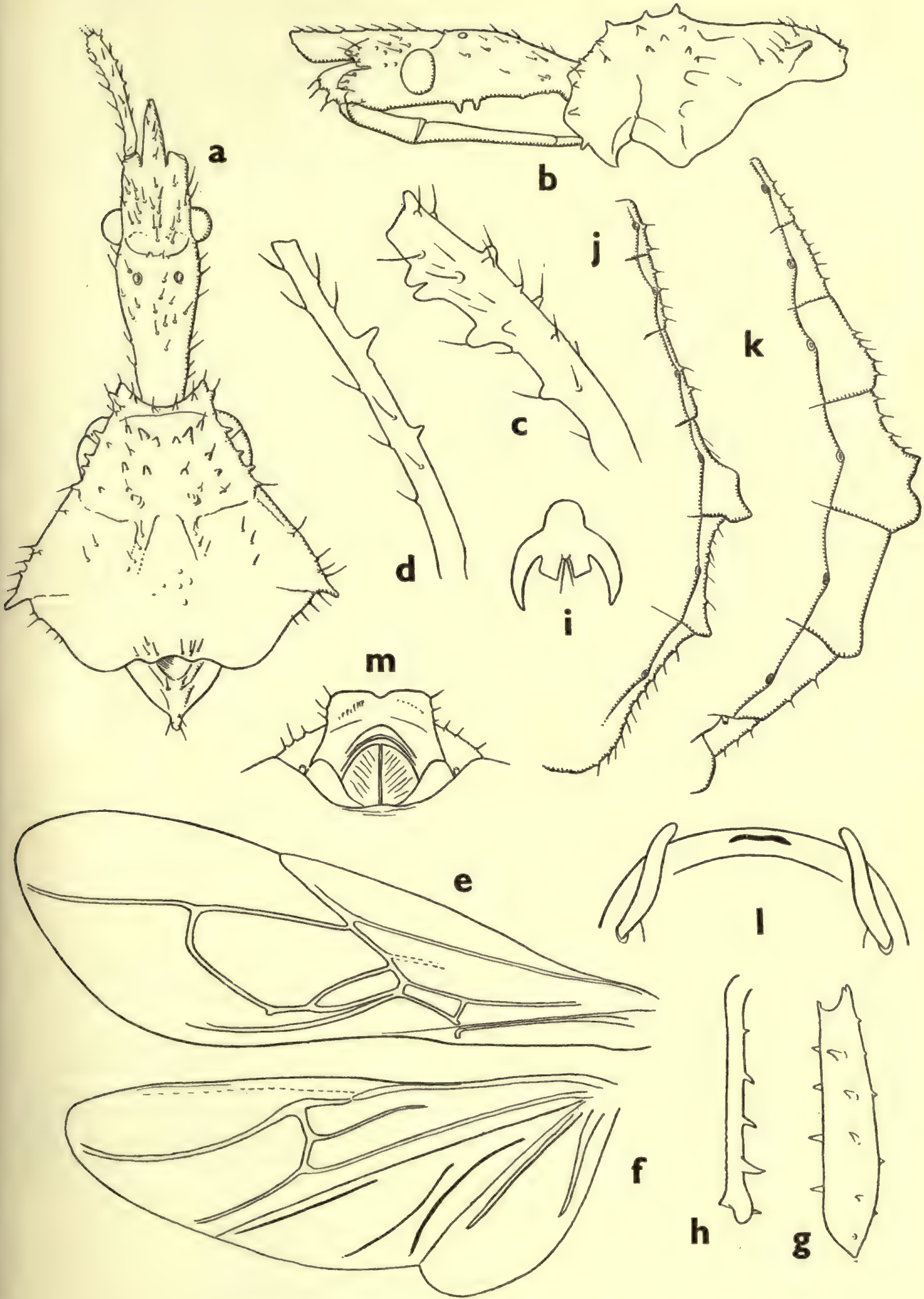
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FIG. 1.—*Henricohahnia wahnschaffei* Breddin.

The specimens on which Breddin based his descriptions were collected by Junghuhn in the Tengger Mountains of East Java. In the British Museum there are also specimens collected by F. C. Drescher in other localities in Java, namely Gunong Slamet at an altitude of 2,200 ft., Gunong Tankoeban Prahoe between 4,000 and 5,000 ft., Gunong Boerangrang at about 4,000 ft. and Gunong Malabar at a similar altitude.

Henricohahnia gallus Distant

(Fig. 2)

Henricohahnia gallus Distant, 1904, *Fauna Brit. Ind. Rhynchota* **2** : 389.

Colour : Dark testaceous. Vertex with three longitudinal parallel stripes, postocular dorsally with two longitudinal parallel stripes not extending to base, laterally with an irregular stripe connecting posteriorly with dorsal stripes, black. Rostrum pale testaceous ; segments 1 and 2 basally, segment 3 apically, suffused with dark brown. Anterior lobe of pronotum with black pattern as in Fig. 2. Corium suffused with piceous apically ; membrane hyaline, pale testaceous ; venation testaceous ; base of veins of cells with a raised pale luteous spot. Apex of scutellum pale luteous ; depressed area of disc piceous. Spines on legs pale yellow.

Structure : Basal segment of antennae strongly tuberculate, a little more than twice as long as produced portion of vertex ; tylus with tubercles ; produced portion of vertex apically from above sub-acute ; laterally sub-truncate. Head sparsely tuberculate. Anterior lobe of pronotum with sparse erect and sub-erect tubercles more or less regularly arranged ; posterior lobe medially depressed with a somewhat obscure, short carina bearing low tubercles, subdorsally ; lobe very sparsely tuberculate ; humeral angles sub-conical and with low setigerous tubercles ; posterior margin undulate. Disc of scutellum somewhat deeply depressed ; apex produced, horizontal, tuberculate. Hemelytra extending very little beyond apex of abdomen.

Total length, 9·00 mm.
Hemelytra, 5·50 mm.
Greatest pronotal width, 2·30 mm.

1♂ (holotype), 1♂, India, Kotagiri, in Brit. Mus. (Nat. Hist.).

Henricohahnia vitticeps sp. n.

(Fig. 3)

Colour : Testaceous. Vertex with a spot laterally, postocular with a wide, median stripe, very narrowly divided medially, and narrow lateral stripes ; anterior lobe of pronotum with linear suffusion, disc of scutellum, black.

Structure : Basal segment of antennae less than twice as long as produced portion of vertex, with short, conical and long cylindrical tubercles bearing setae ; segment 2 with few setigerous tubercles. Produced portion of vertex acute apically. Head and anterior lobe of pronotum sparsely tuberculate. Posterior lobe of pronotum somewhat deeply medially depressed with a carina on each side of depression ; humeral angles not produced, rectangular, rounded ; lobe very sparsely tuberculate ; posterior margin undulate with median incision very broad and shallow. Disc of scutellum feebly transversely depressed posteriorly.

Total length, 11·00 mm.
Hemelytra, 6·50 mm.
Greatest pronotal width, 3.00 mm.

1♀ (holotype), Assam, Utakamund, in Brit. Mus. (Nat. Hist.).

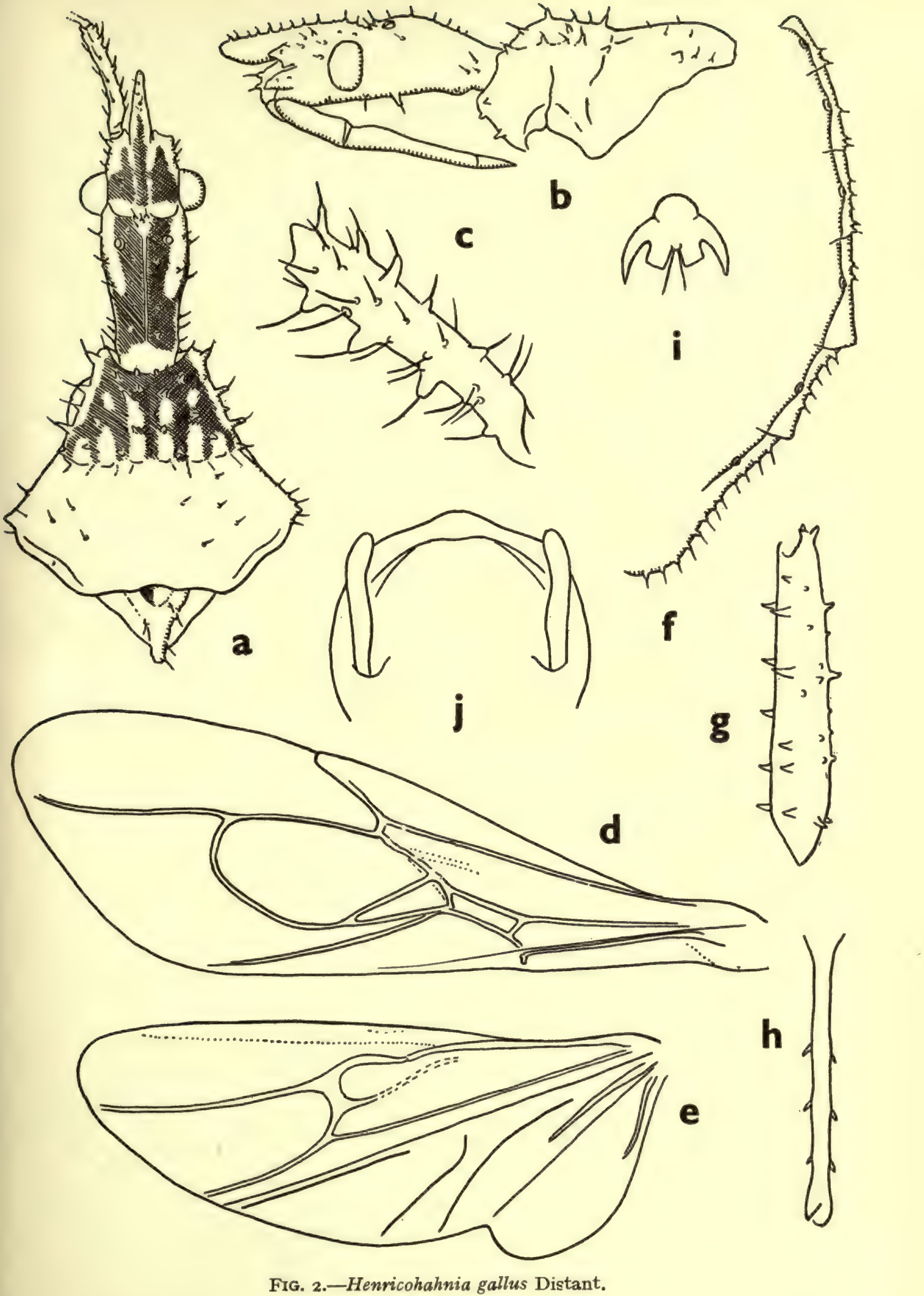
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FIG. 2.—*Henricohahnia gallus* Distant.

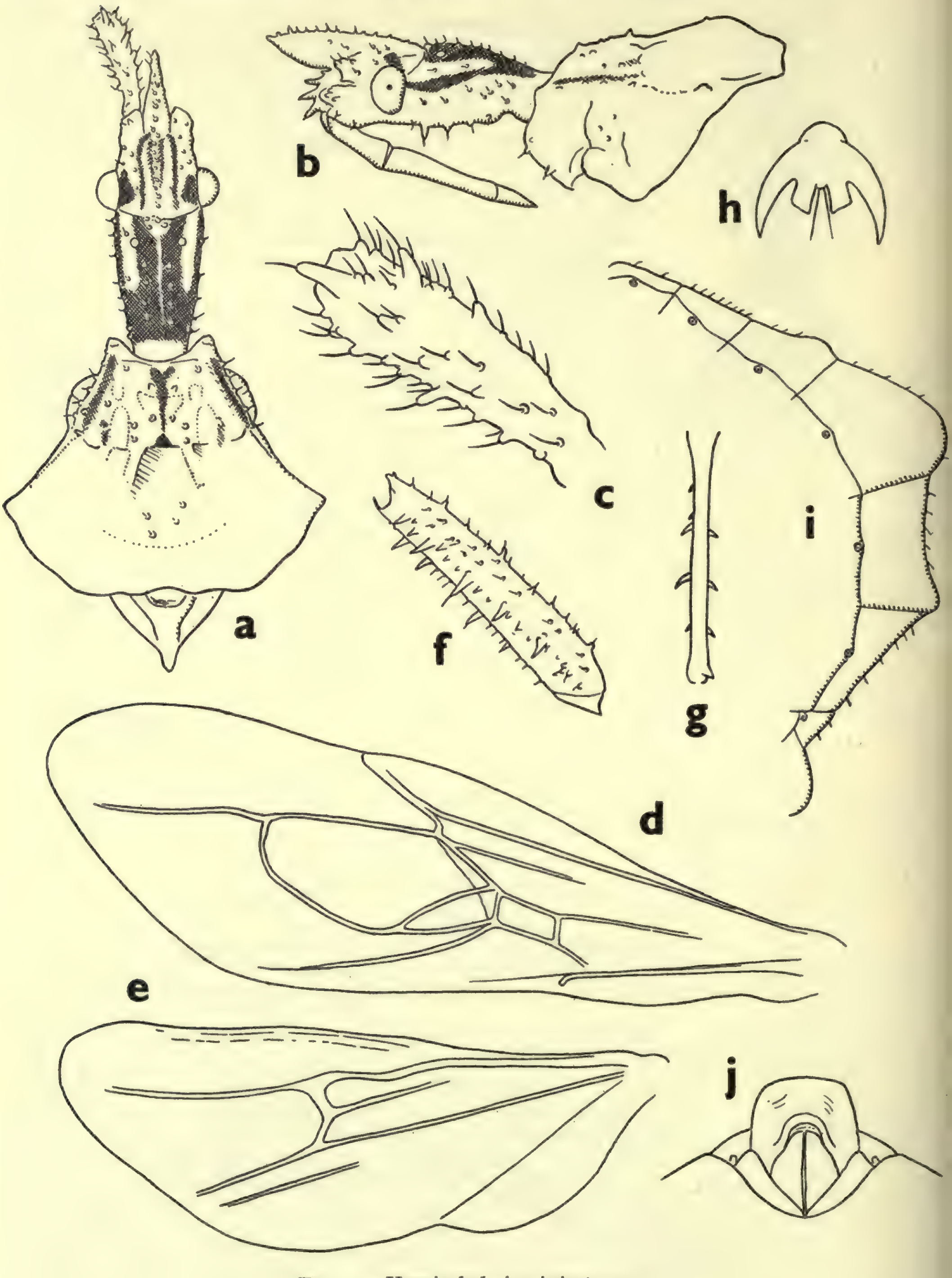
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FIG. 3.—*Henricohahnia vitticeps* sp. n.

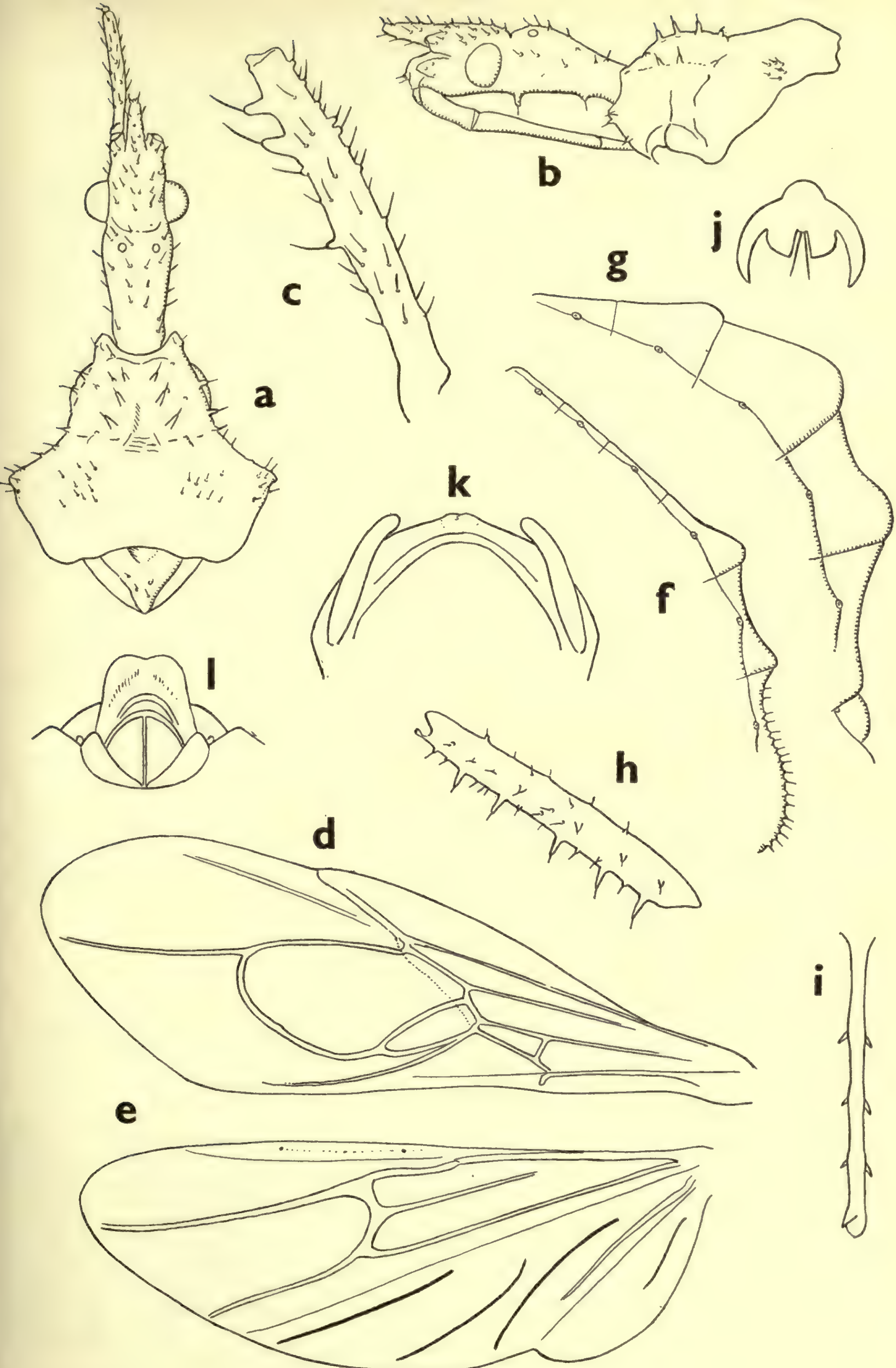
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FIG. 4.—*Henricohahnia indica* sp. n.

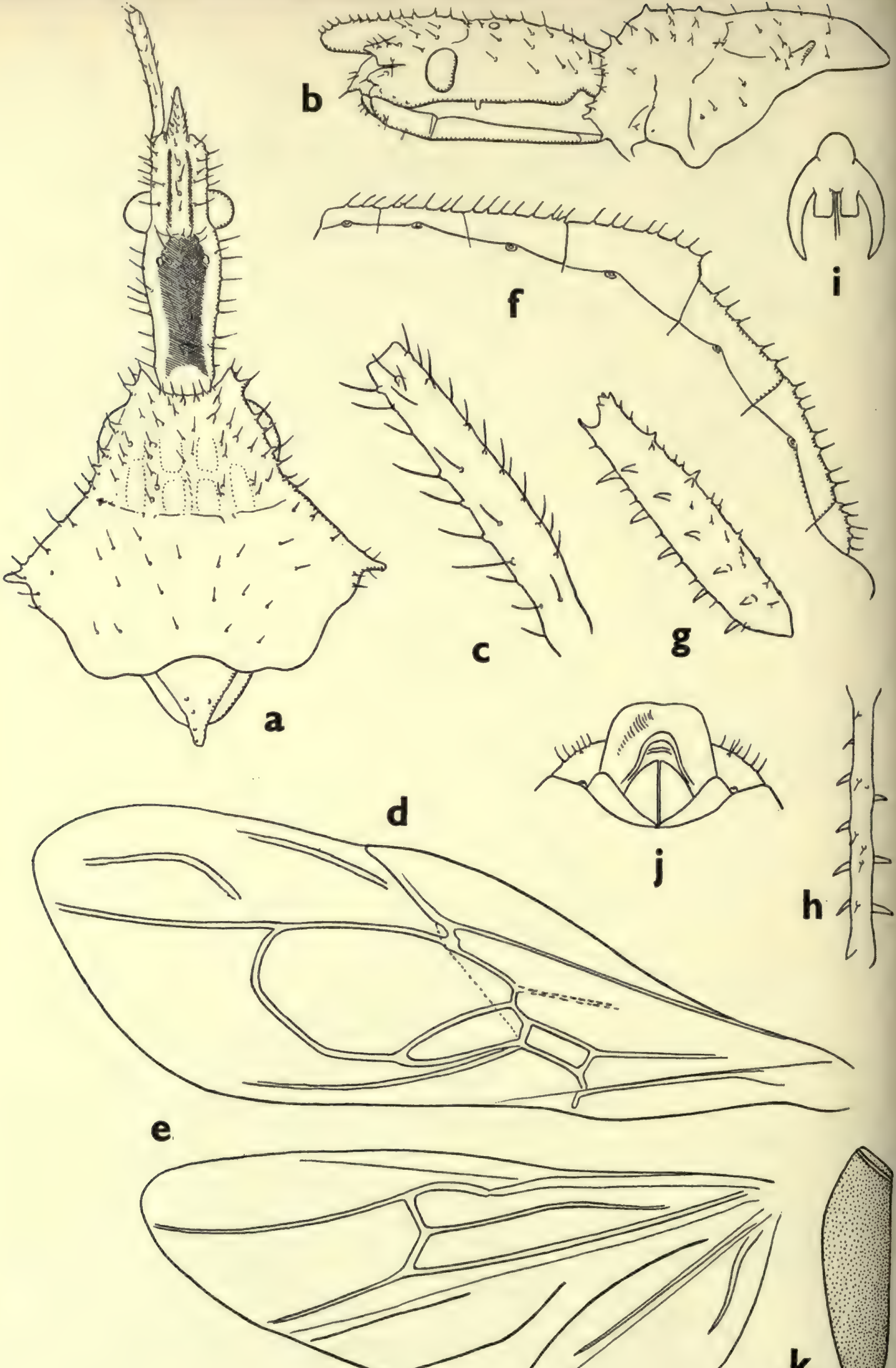
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FIG. 5.—*Henricohahnia spinosa* (Distant).

Henricohahnia indica sp. n.

(Fig. 4)

Colour: Segments 1 and 2 of antennae piceous; remaining segments brown. Head, anterior lobe of pronotum, scutellum piceous; anterior lobe of pronotum with two suffused yellowish spots medially basally; posterior lobe of pronotum, propleura, acetabula and abdomen ventrally, testaceous; meso- and metapleura and sterna piceous; meso- and metasternum with a median testaceous suffusion. Abdomen dorsally brown; connexivum suffused with black; tubercles on ventral surface brown; apex of 7th segment blackish. Corium dark testaceous with the cross-vein at base of internal cell, external half of basal vein of external cell and apex of vein R pale luteous; membrane pale infumate with a coppery lustre; metathoracic wings hyaline, iridescent. Legs blackish; base of anterior tibiae testaceous; spines on anterior femora dark yellow; median and posterior tibiae testaceous with dark brown annulations. Tubercles on anterior lobe of pronotum yellowish.

Structure: Antennae with abundant, moderately long forwardly directed setae and sparse longer setae; basal segment feebly curved, thicker towards apex and thrice as long as produced portion of vertex; tuberculate on lower surface, the apical tubercles the longest. Head sparsely tuberculate; produced portion of vertex from the side rounded apically and with the sides sub-parallel; tylus tuberculate not greatly produced. Lateral angles of collar obtusely conical; anterior lobe of pronotum with a few moderately long setigerous tubercles sub-dorsally and laterally; humeral angles obtusely conical; posterior lobe of pronotum with very sparse, low tubercles; posterior margin sinuate with median incision very wide and shallow. Disc of scutellum shallowly depressed. Hemelytra extending just beyond apex of abdomen. External apical angle of connexival segment 5 lobately produced, of segment 6 obtuse angulate. Anterior femora and tibiae with moderately long and short setigerous spines; median and posterior femora with low, setigerous tubercles.

Total length: ♂, 9·50 mm.; ♀, 10·60 mm.
Hemelytra: ♂, 6·50 mm.; ♀, 6·50 mm.
Greatest pronotal width: ♂, 2·50 mm.; ♀, 3·00 mm.

1♂ (holotype) and 3♂, 2♀ (paratypes), S. India (no precise locality) (B.M. 1930–599); 1♂, 1♀ (paratypes), S. India, Lovedale, Nilgiri Hills (B.M. 1915–60); 1♂ (paratype), S. India; Kodai Kanal (B.M. 1926–171); all collected by T. V. Campbell.

Henricohahnia spinosa (Distant)

(Fig. 5)

Forestus spinosus Distant, 1903, *Ann. Mag. Nat. Hist.* (7) **11**: 252.
Henricohahnia spinosa (Distant), 1904, *Fauna Brit. Ind. Rhynchota* **2**: 388.

Colour: Pale testaceous. Vertex with two parallel, narrow, longitudinal stripes, postocular with a wide median longitudinal stripe, black. Humeral spines light brown. Veins of discal cell of corium and apical margin, except extreme apex, pale luteous. Costal margin of corium suffused with piceous. Membrane pale infumate; venation testaceous. Segments 2, 5 and 6 apically and base of segment 7 of connexivum piceous; marginal tubercles mostly black. Spines on femora whitish, very narrowly brown apically. Metathoracic wings infumate; venation dark testaceous.

Structure. Basal segment of antennae sparsely tuberculate, a little more than twice as long as produced portion of vertex. Tylus more or less vertical with an apical tubercle. Produced portion of vertex rounded apically. Head and pronotum sparsely tuberculate. Posterior lobe of pronotum with indications of short carinae sub-dorsally; humeral angles spinously produced; posterior margin undulate with the median incision moderately deep. Disc of

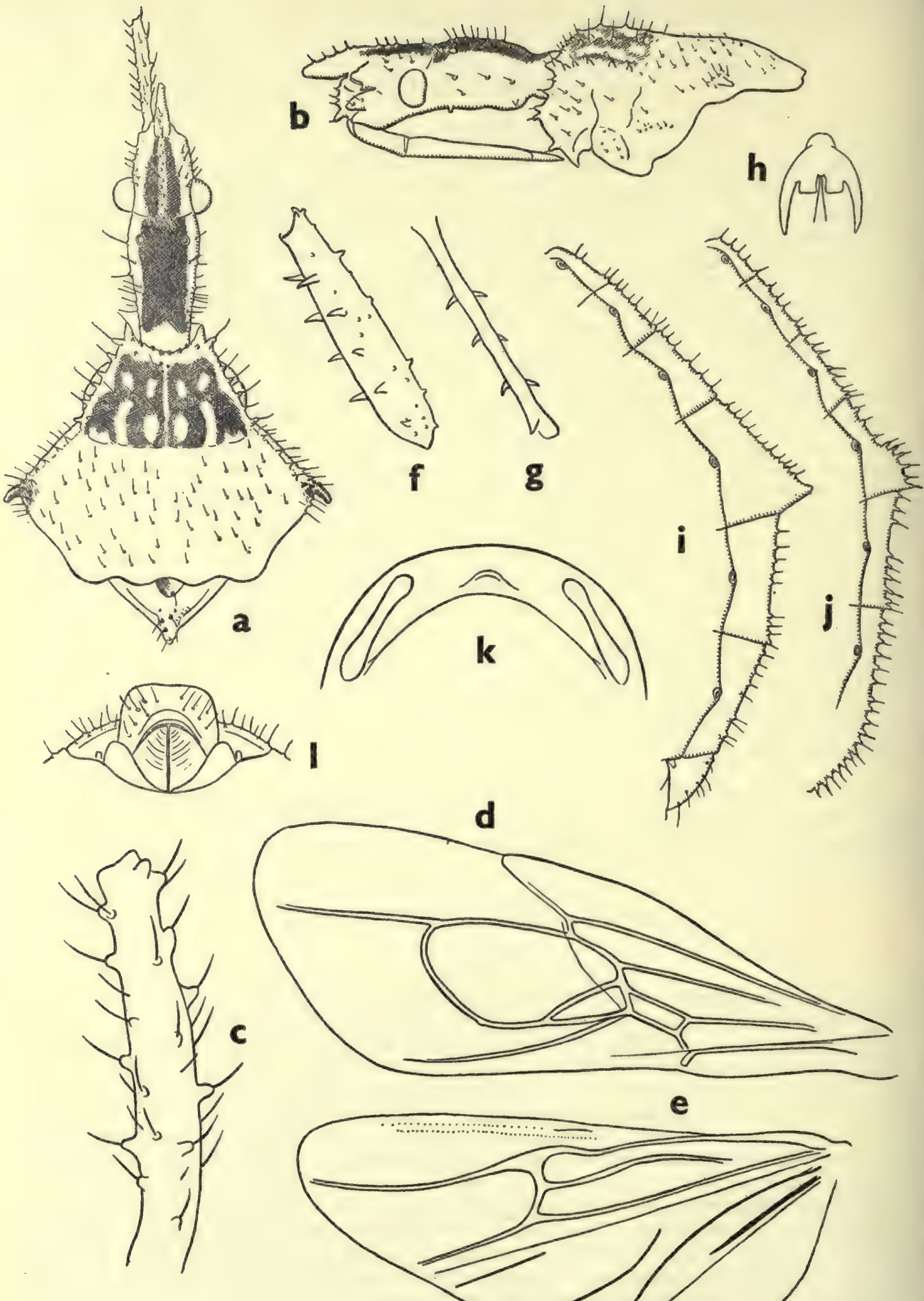

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FIG. 6.—*Henricohahnia tinctoria* sp. n.

scutellum damaged; apex moderately produced, horizontal. Hemelytra extending just beyond apex of abdomen.

Total length, 12·50 mm.
Hemelytra, 8·50 mm.
Greatest pronotal width, 3·50 mm.

1♀ (holotype), Assam; Sikkim (Atkinson Coll., B.M. 1892–6); 2♀, same locality (Distant Coll., B.M. 1911–383); 2♀, Bengale, Kurseong (Distant Coll., B.M., 1911–383); 1♀, Dharmoto, Kumaon, 5,600 ft., 9.vi.1912 (*A. D. Imms*); 1♀, Chaurata. The ovum of *H. spinosa* is cylindrical, rather strongly curved at opercular end. Total length, 2·30 mm.

Henricohahnia tinctoria sp. n.

(Fig. 6)

Colour: Testaceous. Head with two longitudinal, parallel black stripes from base of produced portion of vertex to transverse sulcus and a wide black stripe thence almost to base. Ocelli margined with red. Anterior lobe of pronotum with piceous pattern as in Fig. 6. Spines at humeral angles piceous. Tubercles on both pronotal lobes brownish or piceous. Dorsal surface of abdomen, except connexivum, base of clavus broadly and of corium narrowly, red; corium apically with a U-shaped raised luteous spot; remainder of corium faintly suffused with red; vein Sc of metathoracic wing red. Connexivum with segments 2–6 dorsally with a large irregular piceous spot apically. Mesopleural episternum anteriorly suffused with piceous. Tubercles on pleura and abdomen ventrally piceous.

Structure: Basal segment of antennae more or less straight, not very strongly tuberculate and somewhat narrower towards apex; segment 2 about one-third longer than 1 and without tubercles. Head sparsely tuberculate. Basal segment of rostrum extending very little beyond anterior margin of eyes. Humeral angles spinously produced, the spines rounded apically and directed posteriorly somewhat; posterior lobe of pronotum with sparse, very low, setigerous tubercles; posterior margin regularly undulate, the median incision moderately deep. Disc of scutellum very deeply depressed; carina with a few low tubercles. All segments of connexivum with short, marginal tubercles; segment 7 of abdomen dorsally transversely rugose in apical half. Hemelytra extending just beyond apex of abdomen.

In the female paratype the basal antennal segment is more strongly tuberculate and segment 2 is relatively shorter and feebly tuberculate.

Total length: ♂, 12·00 mm.; ♀, 13·50 mm.
Hemelytra: ♂, 7·50 mm.; ♀, 13·50 mm.
Greatest pronotal width: ♂, 3·50 mm.; ♀, 4·00 mm.

1♂ (holotype), Sikkim, Rongli Chu, 3,000 ft., 29.iii.1924 (B.M. 1924–386); 1♂, 1♀ (paratypes), Sikkim, Singhik, 3,500 ft., 23.iv.1924 (B.M. 1924–386); coll. Maj. R. W. G. Hingston (B.M. Everest Expedition).

Henricohahnia vittata sp. n.

(Fig. 7)

Colour: Testaceous. Posterior lobe of pronotum with a diagonal, longitudinal stripe within depressions, pro- and mesopleura with a transverse stripe, metapleural acetabula and apex of tibiae piceous; coxae with suffused piceous spot. Corium testaceous; apical half of clavus, membrane and metathoracic wings infumate.

Structure: Basal segment of antennae twice as long as produced portion of vertex, feebly

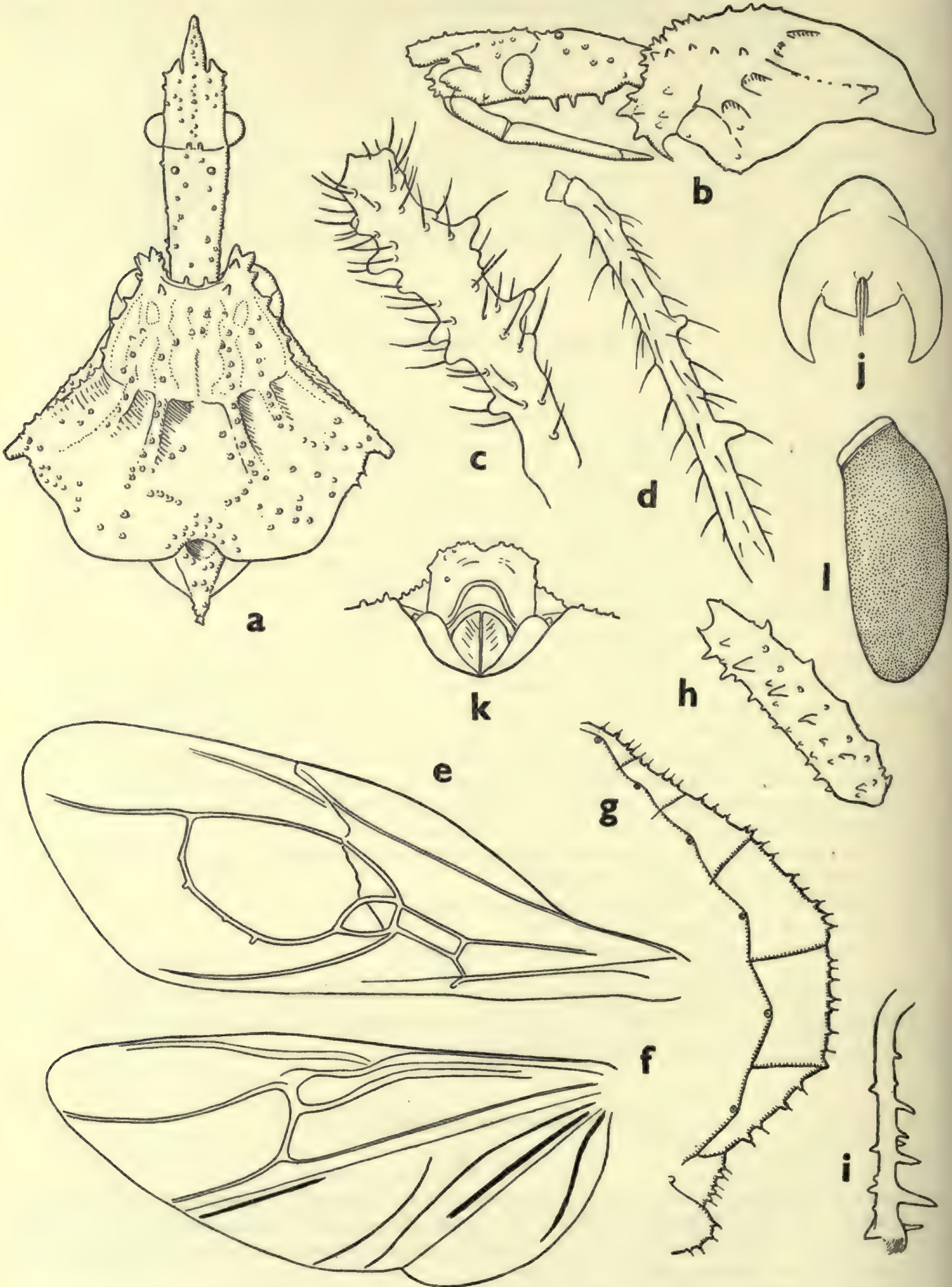
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FIG. 7.—*Henricohahnia vittata* sp. n.

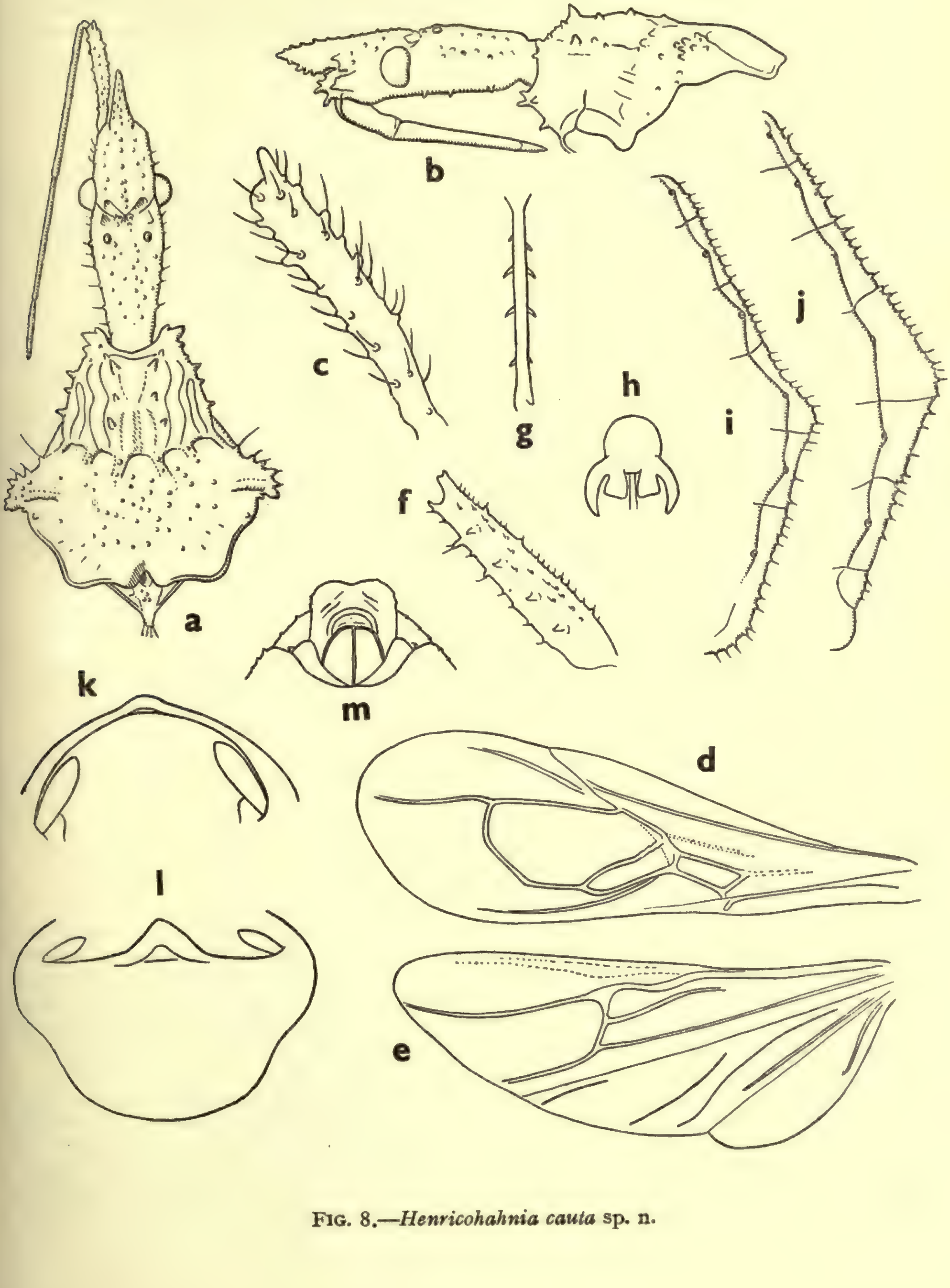
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FIG. 8.—*Henricohahnia cauta* sp. n.

curved and strongly tuberculate. Head with abundant, erect, moderately long setae, sparsely tuberculate. Posterior lobe of pronotum with very strong sub-dorsal carinae and less strong lateral carinae ; humeral angles tuberculately produced ; median incision on posterior margin of lobe regularly concave. Disc of scutellum deeply depressed ; carina and apex irregularly tuberculate. Head, body, legs with abundant setae. Anterior coxae and trochanters strongly, median coxae and trochanters, moderately tuberculate.

Total length, 18·00 mm.
Hemelytra, 12·00 mm.
Greatest pronotal width, 3·80 mm.

1♀ (holotype), Indo-China ; Laos, Xieng Khouang, 10.v.1919 (*R. V. de Salvaza*) (B.M. 1917–98). An ovum dissected from this female is dark brown with the differentiated portion of the chorion whitish. It is cylindrical, glabrous, somewhat narrower at the opercular end and with one side straight. Total length, 2·40 mm.

Henricohahnia cauta sp. n.

(Fig. 8)

Colour : Testaceous. Humeral angles of pronotum and apex of corium suffused with brown. Membrane and metathoracic wings faintly infumate, iridescent. Pygophore and metapleura suffused with piceous. Lateral tubercles of prosternum piceous.

Structure : Basal segment of antennae with short, conical setigerous tubercles and two longer cylindrical tubercles on upper surface, apically ; remaining segments with sparse, moderately long, abundant, short setae. Produced portion of vertex from above very narrowly triangular, acute apically ; from the side triangular, acute apically.

Total length : ♂, 12·00 mm. ; ♀, 12·10 mm.
Hemelytra : ♂, 7·00 mm. ; ♀, 7·00 mm.
Greatest pronotal width : ♂, 3·50 mm. ; ♀, 3·30 mm.

1♂ (holotype), Indo-China, Haut Mekong, Nam Mat, 15.iv.1918 ; 3♀ (paratypes), Laos, Xieng Khouang, 7–17.v.1918 (*R. V. de Salvaza*) (B.M. 1918–1).

Henricohahnia typica (Distant)

(Fig. 9)

Forestus typicus Distant, 1903, *Ann. Mag. Nat. Hist.* (7) **11** : 251.
Henricohahnia typica (Distant), 1904, *Fauna Brit. Ind. Rhynchota* **2** : 387.

Colour : Testaceous, except dorsum of abdomen, pale reddish ; tubercles on connexivum mostly piceous ; segments 5–7 dorsally suffused with black. Basal half of clavus and extreme base of corium reddish ; base of veins of membranal cells and an irregular suffusion on corium apically pale luteous ; membrane faintly infumate ; venation darker. Coxae with piceous spots. Vein SC of metathoracic wing pale yellow, except apical fourth violaceous ; wing faintly infumate, iridescent ; remaining veins dark brown. In the male, the pygophore has two large, suffused piceous spots.

Structure Basal segment of antennae strongly tuberculate and with a long tubercle on upper apical margin ; segment less than half as long as produced portion of vertex ; tylus with moderately long, setigerous tubercles ; produced portion of vertex from above and from the side acute apically. Head sparsely tuberculate. Anterior lobe of pronotum with conical, acute, moderately long and short tubercles ; lateral angles of collar conically produced ; posterior lobe with strong carinae anteriorly, sub-dorsally ; humeral angles conical, strongly

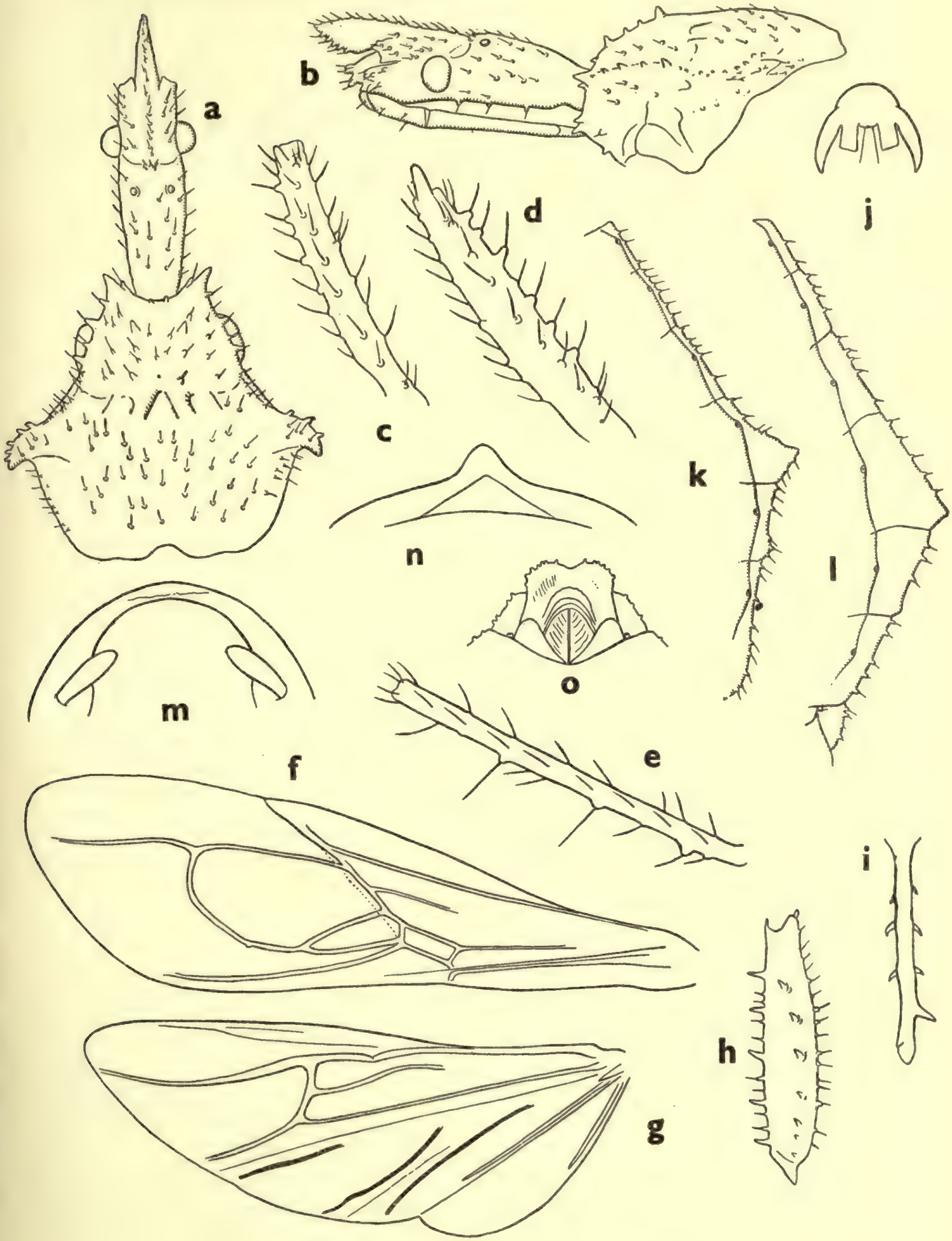
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FIG. 9.—*Henricohahnia typica* (Distant).

recurved, tuberculate; posterior margin of lobe feebly undulate. Hemelytra extending very little beyond apex of abdomen.

Total length: ♂, 11·50 mm.; ♀, 13·50 mm.
Hemelytra: ♂, 7·00 mm.; ♀, 8·00 mm.
Greatest pronotal width: ♂, 3·00 mm.; ♀, 3·80 mm.

1♀ (holotype), Assam, Sikkim, 5♂, 3♀, same locality (Atkinson Coll., B.M. 1892–6); 1♂, N. Khasia, 1,500–3,000 ft. (Distant Coll., B.M. 1911–383).

Henricohahnia montana (Distant)

(Fig. 10)

Forestus montanus Distant, 1903, *Ann. Mag. Nat. Hist.* (7), **11**, 252.
Henricohahnia montana (Distant), 1903, *Fauna Brit. India Rhynchota* **2**, 388).

The following is a description of the male:

Colour: Head and thorax piceous; anteocular laterally with a light brown spot in front of eyes; postocular in front and between ocelli, extreme base of head, anterior lobe of pronotum, propleural epimeron, metapleural acetabula anteriorly and rostrum, light brown. Posterior margin of posterior lobe of pronotum suffused with brown. Meso- and metasternum and abdomen ventrally, light brown with faint reddish suffusion. Femora piceous; tibiae brown with a pale yellowish annulation interrupted on outer surface. Corium brown with an irregular luteous spot at base of veins of membrane and with piceous suffusion; membrane and metathoracic wings faintly infumate, iridescent. Setae and pubescence pale fulvous.

Structure: Basal segment of antennae a little less than twice as long as produced portion of vertex, feebly tuberculate; remaining segments without tubercles and with dense, short setae and sparse longer setae. Head sparsely tuberculate except basally, laterally; ventro-lateral margin with moderately long tubercles. Basal segment of rostrum extending to middle of eyes. Tubercles on anterior lobe of pronotum short, conical except tubercles sub-dorsally, basally which are moderately long; posterior lobe of pronotum sparsely tuberculate, except at humeral angles; lobe with an arcuate carina sub-dorsally and a short transverse carina from humeral angles; posterior margin sinuate; spines at humeral angles thick, rounded apically and directed posteriorly somewhat. Disc of scutellum deeply depressed; carina with a few tubercles. Segment 7 of abdomen dorsally transversely striate in apical half; segments 5 and 6 of connexivum produced; external margin of segments with low, setigerous tubercles; connexivum ventrally very narrow; spiracles with ostiole directed outwards; lateral margin of abdomen ventrally carinate.

Total length: ♂, 13·00 mm.; ♀, 14·00 mm.
Hemelytra: ♂, 7·50 mm.; ♀, 8·00 mm.
Greatest pronotal width: ♂, 4·00 mm.; ♀, 4·50 mm.

The holotype of *H. montana*, a female from Mungphu, Assam (Distant Coll., B.M. 1913–451), in the British Museum, differs in coloration from the male in having the head and body dark testaceous and the apex of the corium luteous. The 3rd antennal segment is pale yellow in the basal half. The basal antennal segment is strongly tuberculate and segment 2 is relatively shorter and has a few tubercles. The spiracles are normal and the connexivum wide ventrally. In the British Museum there is also a male from E. Garo, Assam, collected at an altitude between 1,500 and 2,500 ft. (Distant Coll., B.M. 1911–383), and a male and a female from N. Khasia from a similar altitude (B.M. 1914–383). There are also females from Shillong, Assam, altitude 4,900 ft. (B.M. 1913–451).

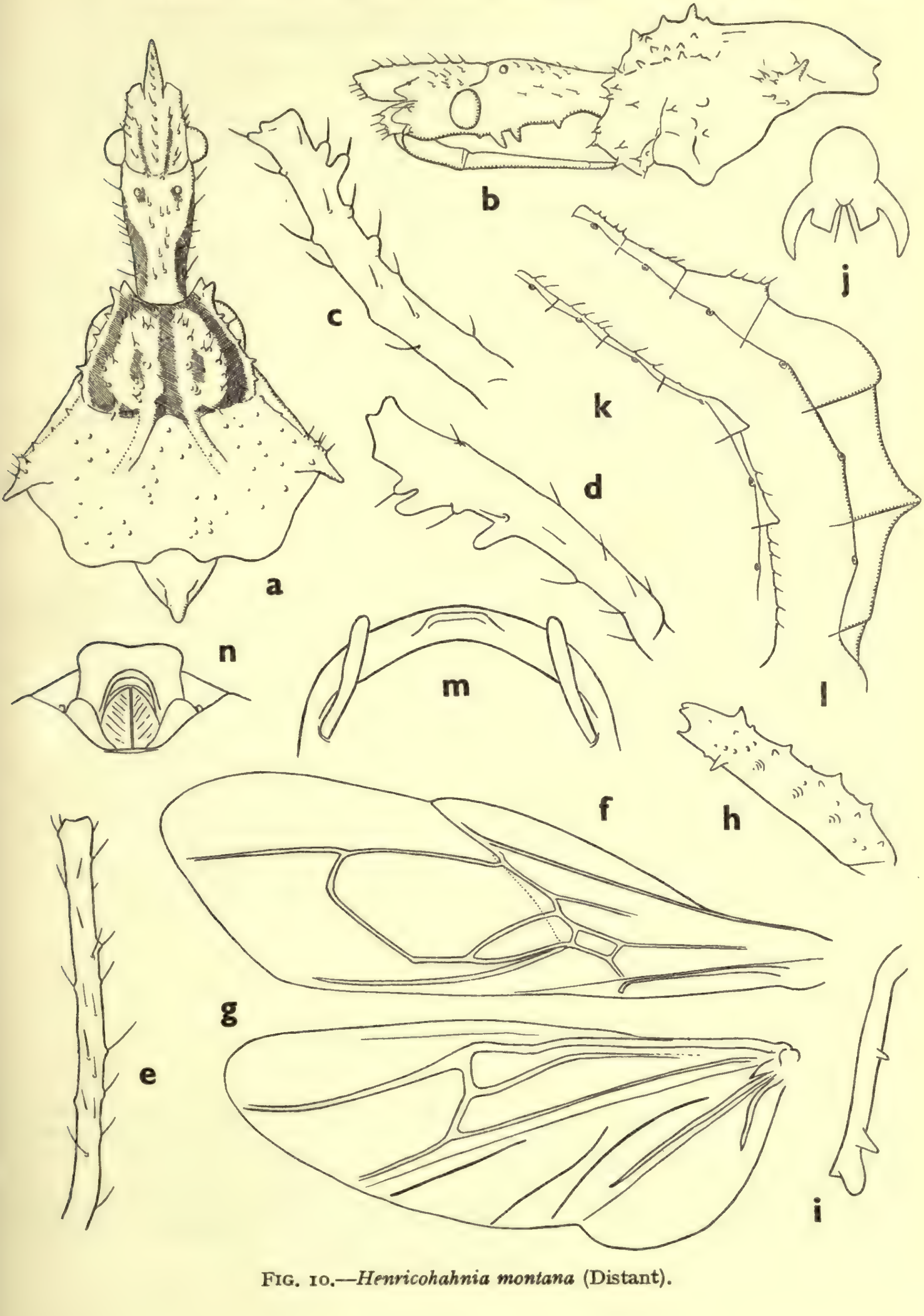
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FIG. 10.—*Henricohahnia montana* (Distant).

Key to Genera allied to *Henricohahnia*.

1. Basal antennal segment with moderately long cylindrical tubercles ; abdomen mid-ventrally carinate ; coxae and trochanters spinose . . *Henricohahnia* Breddin.
–. Basal antennal segment with low, rounded tubercles ; abdomen not carinate ventrally ; coxae sometimes with a very few spines ; trochanters without spines . . . . 2.
2. Head and anterior lobe of pronotum with strong black pattern . *Tapirocoris* gen. nov.
–. Head and anterior lobe of pronotum without pattern . . . . 3.
3. Head and pronotum with abundant, low tubercles . . . . 4.
–. Head and pronotum with sparse low tubercles . . . . 5.
4. Humeral angles narrowly rounded or conical ; anterior tibiae with few or no spines *Karenocoris* gen. nov.
5. Humeral angles broadly rounded ; anterior tibiae with six or more spines *Malaiseana* gen. nov.

Key to Species of *Karenocoris* gen. nov.

1. Head and pronotum strongly tuberculate ; humeral angles conical . . . . . 2.
–. Head and pronotum moderately tuberculate ; humeral angles rounded . *pustulatus* sp. n.
2. Posterior margin of posterior pronotal lobe undulate with deep median incision *badgleyi* (Distant).
–. Posterior margin of posterior pronotal lobe undulate . . . *inermis* (Distant).

Karenocoris gen. nov.[1]

Size small. Basal segment of antennae tuberculate, longer than anteocular. Postocular longer than anteocular with sides parallel ; constricted basally. Head cylindrical, shorter than pronotum, ventro-laterally spinose ; entirely tuberculate, except ventrally, basally and a narrow area on vertex, smooth ; vertex produced anteriorly. Ocelli small, widely separated. Basal segment of rostrum extending to middle of eyes, a little more than half as long as segment 2 ; segments 2 and 3 straight. Pronotum longer than wide ; anterior lobe shorter than posterior lobe ; both lobes with a median sulcus and tubercles which are arranged in rows on anterior lobe ; posterior margin of posterior lobe undulate. Scutellum longer than wide, produced apically. Pleura, abdomen ventrally and lateral margins of connexival segments tuberculate. Hemelytra with internal cell of membrane very small ; corium pubescent ; base of cells of membrane sclerotized. Femora smooth ; anterior and median femora with tubercles on upper and lateral surfaces ; anterior femora with a row of spines on lower outer surface and a single spine on inner lower surface ; median femora with a spine on lower surface ; anterior and median tibiae tuberculate ; anterior tibiae sinuate apically and with a projection sub-apically ; tarsi tuberculate.

Type species : *Karenocoris pustulatus* sp. n.

Karenocoris pustulatus sp. n.

(Fig. 11)

Colour : Antennae, head, thorax, legs, abdomen ventrally and corium, dark testaceous ; head, pronotum and propleural epimeron suffused with piceous. Abdomen dorsally black ; connexival segments with a small yellowish spot basally. Tubercles piceous. Tibiae suffused with piceous apically

Structure : Basal segment of antennae feebly curved and feebly tuberculate, the tubercles setigerous. Produced portion of vertex from above narrow with the sides parallel. Transverse

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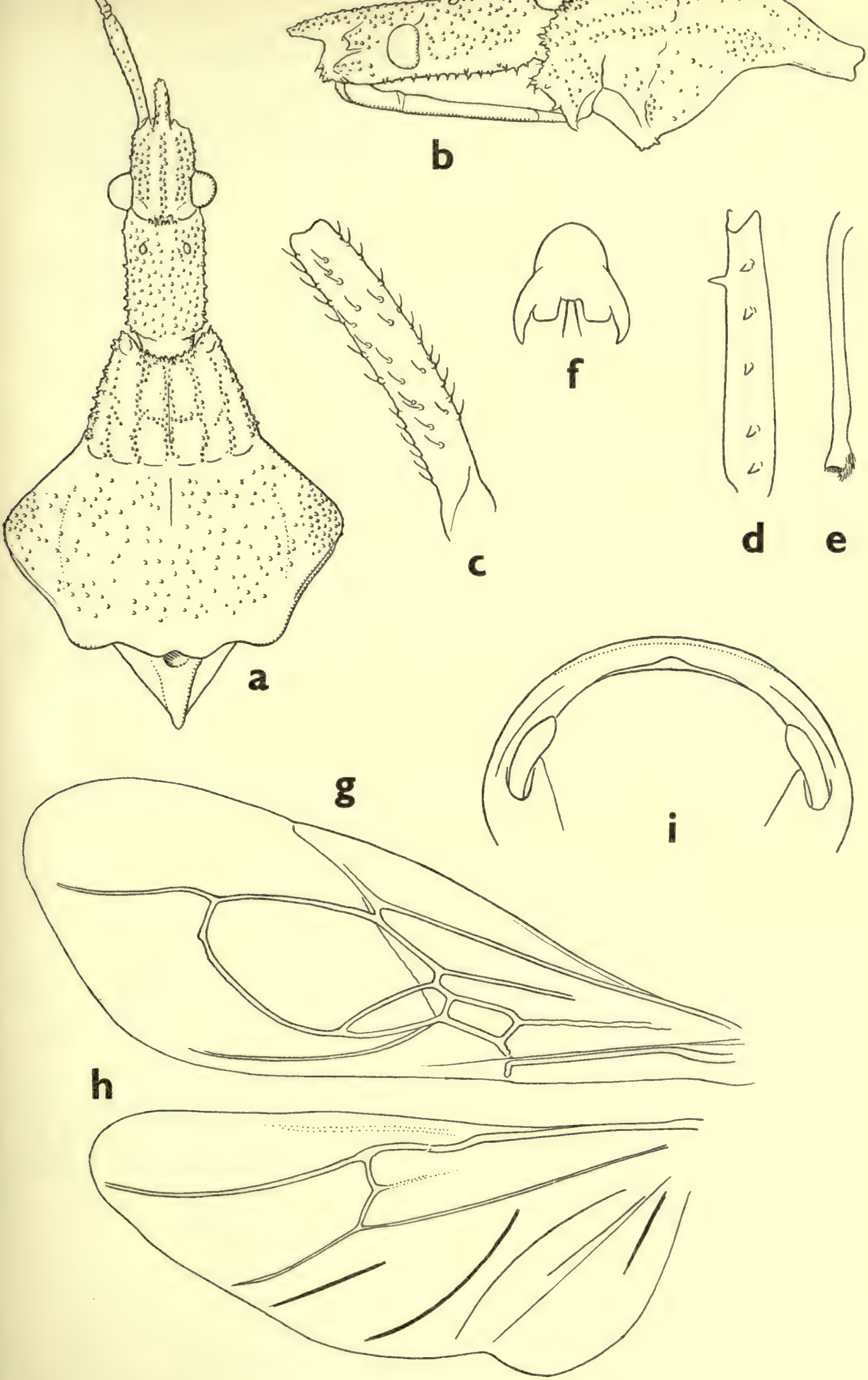
[1] Karen, a Burmese people.



pustulatus sp. n.

sulcus on vertex situated behind eyes and interrupted medially. Ocellar interspace less wide than distance between an ocellus and an eye. Anterior margin of anterior pronotal lobe strongly tuberculate ; sulcus on anterior lobe very narrow, not extending to anterior or posterior margins ; sulcus on posterior lobe very feebly indicated. Disc of scutellum deeply foveolate ; produced apical portion horizontal. Abdomen dorsally smooth, except apical third of 7th segment, transversely rugose.

Total length, 11·30 mm.
Hemelytra, 7·60 mm.
Greatest pronotal width, 3·10 mm.

1♂ (holotype), Upper Burma, Seinghka Valley, Aduna confluence, 28·5 N.–97·35 E., 4,500, 3.v.1926 (*E. Kingdon Ward*) (B.M. 1926–400).

Karenocoris inermis (Distant)

(Fig. 12)

Forestus inermis Distant, 1903, *Ann. Mag. Nat. Hist.* (7) **11** : 253.
Henricohahnia inermis (Distant), 1904, *Fauna Brit. Ind. Rhynchota* **2** : 389.

Colour : Testaceous. Dorsal surface of abdomen piceous ; connexivum dark testaceous with a yellowish spot basally. Membrane infumate.

Structure. Basal segment of antennae feebly curved with short curved setae arising from tubercles. Produced portion of vertex relatively short, thick, narrowly rounded apically. Posterior lobe of pronotum rugose, tuberculate ; humeral angles sub-conical ; posterior margin of lobe undulate with feeble median incision. Disc of scutellum damaged ; apex sub-acute. Anterior tibiae with two spines sub-basally ; anterior femora with 7 spines on lower inner surface and 1 spine on lower outer surface. Hemelytra extending just beyond apex of abdomen.

Total length, 13·00 mm.
Hemelytra, 7·50 mm.
Greatest pronotal width, 3·10 mm.

The type of *Karenocoris inermis*, a female, is from Mungphu (Atkinson Coll., Brit. Mus. 1892–6). In the British Museum there is also a female from Sikkim (B.M. 1911–383).

Karenocoris badgleyi (Distant)

(Fig. 13)

Henricohahnia badgleyi Distant, 1909, *Ann. Soc. ent. Belg.* 53 : 373.

Colour : Antennae, head, posterior lobe of pronotum, piceous ; anterior lobe of pronotum and rostrum, brown. Pleura, sterna, legs light brown ; pleura suffused with piceous. Abdomen dorsally black ; connexivum brown with a yellow spot on each segment basally ; abdomen ventrally testaceous with brown suffusion laterally and dark brown tubercles. Corium brown ; membrane hyaline, infumate.

Structure : Basal segment of antennae feebly curved with short, curved, spatulate setae arising from tubercles. Produced portion of vertex moderately thick, about half as long as basal antennal segment. Both lobes of pronotum smooth, tuberculate ; anterior lobe feebly depressed medially ; tubercles on posterior lobe arranged more or less in transverse rows ; humeral angles sub-acute ; median incision on posterior lobe of pronotum deep, acute angular. Hemelytra extending just beyond apex of abdomen.

Total length, 11·00 mm.
Hemelytra, 7·00 mm.
Greatest pronotal width, 3·00 mm.

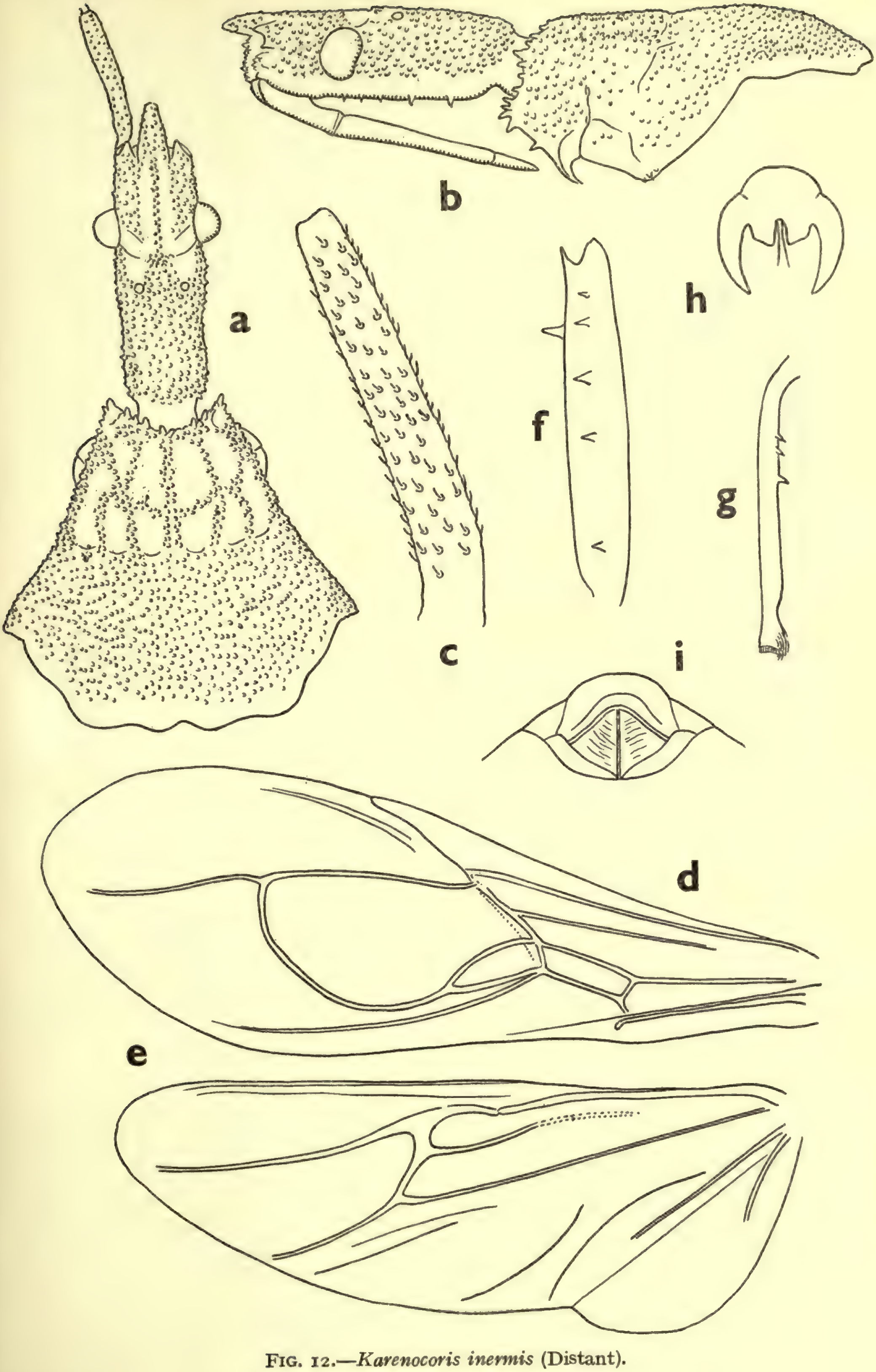


FIG. 12.—*Karenocoris inermis* (Distant).

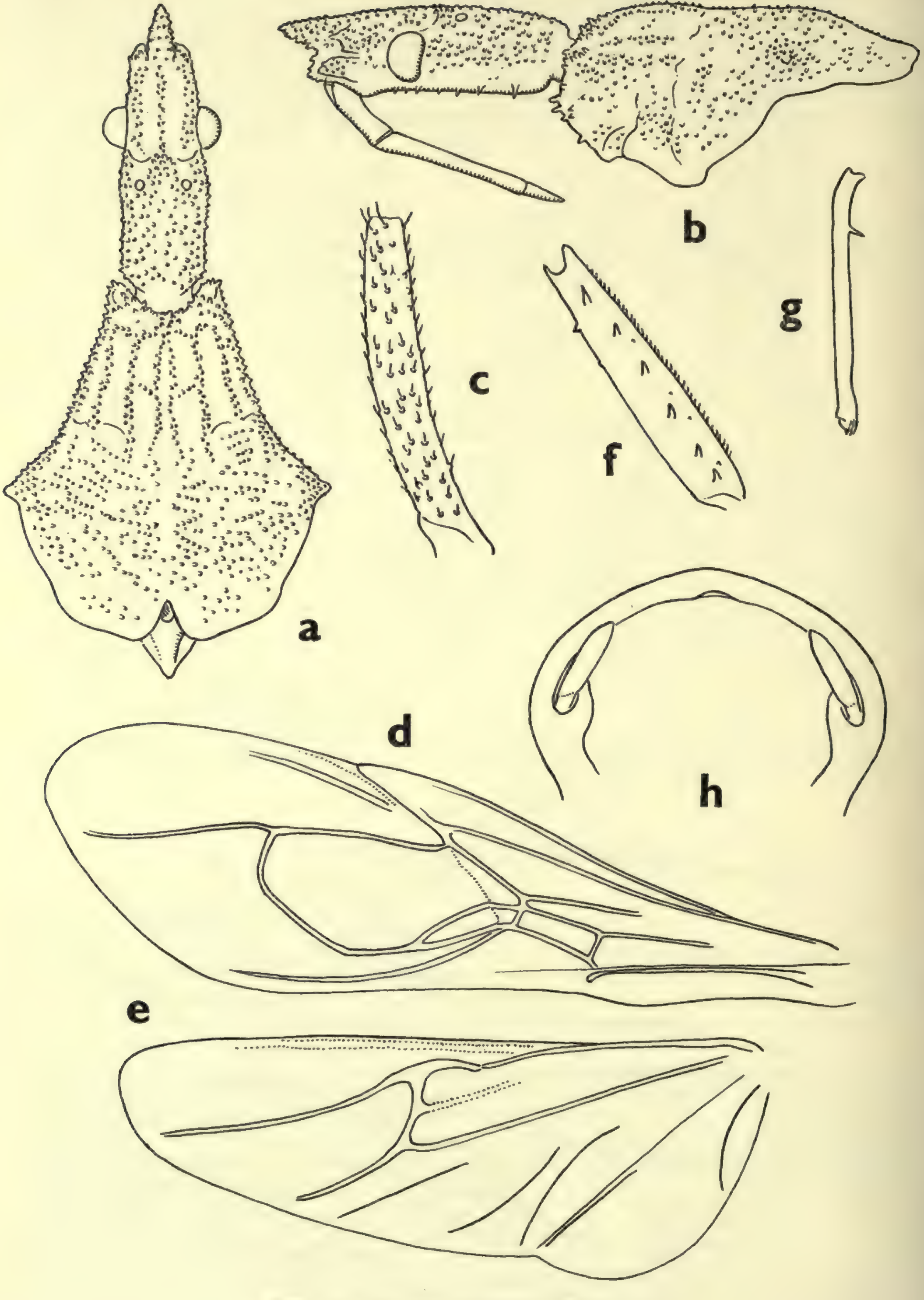


FIG. 13.—*Karenocoris badgleyi* (Distant).

The type of *Karenocoris badgleyi*, a male, is from Assam ; collector W. F. Badgley (B.M. 1906–185). There is also a male from the same source.

Malaiseana gen. nov.[1]

Size small. Basal segment of antennae tuberculate, longer than anteocular ; postocular longer than anteocular, somewhat globose then narrowed. Head cylindrical, shorter than pronotum ; dorsally tuberculate ; vertex produced anteriorly ; gular region with spines. Ocelli small, widely separated. Basal segment of rostrum extending beyond anterior margin of eyes, less than half as long as segment 2 ; segments 2 and 3 straight. Pronotum wider than long ; transverse sulcus indistinct medially ; both lobes tuberculate and medially longitudinally sulcate, the sulcus not extending to posterior margin of either lobe ; posterior margin of posterior lobe undulate. Scutellum longer than wide, triangular with apex produced. External apical angle of connexival segments 5 and 6 produced ; external margins of segments partly tuberculate. Abdomen tuberculate ventrally. Hemelytra with internal cell of membrane very small ; base of cells of membrane sclerotized. Femora nodulose ; anterior femora with spines on lower surface ; median femora with a single spine on lower surface ; tibiae shorter than femora ; anterior tibiae with spines. Corium setose.

Type species : *Malaiseana annulipes* sp. n.

Malaiseana annulipes sp. n.

(Fig. 14)

Colour : Piceous. Segment 2 of rostrum dark brown. Acetabula, suffusion and spots on pleura and posterior lobe of pronotum, testaceous. Connexival segments with a yellowish spot basally ; abdomen ventrally testaceous with suffusion and tubercles piceous ; pygophore piceous. Tibiae and posterior femora with a median yellowish annulation.

Structure : Basal segment of antennae with short, forwardly directed setae arising from low tubercles. Produced portion of vertex sub-acute, feebly curved downwards, cylindrical. Vertex medially and inter-ocellar area, smooth, without tubercles. Ocellar interspace less wide than distance between an ocellus and an eye. Lateral angles of collar with low, conical tubercles. Disc of scutellum feebly depressed. Hemelytra extending a little beyond apex of abdomen. Anterior tibiae with 5 spines on outer and inner surfaces. Pale areas of connexivum not tuberculate.

Total length, 10·00 mm.
Hemelytra, 6·50 mm.
Greatest pronotal width, 3·00 mm.

1♂ (holotype), N.E. Burma, Kambaiti, 7000 ft., 18.v.1934 (*R. Malaise*) (B.M. 1935–630).

Tapirocoris gen. nov.[2]

Size small. Basal segment of antennae tuberculate, longer than anteocular, postocular somewhat globose, constricted basally. Head shorter than pronotum ; dorsally and laterally tuberculate ; vertex produced anteriorly. Ocelli small, widely separated. Basal segment of rostrum half as long as segment 2, not extending to anterior margin of eyes ; segments 2 and 3 straight. Pronotum wider than long ; transverse sulcus interrupted medially ; anterior lobe with setigerous tubercles laterally and some low, tubercles on disc ; posterior lobe smooth ;

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[1] Dedicated to Dr. R. Malaise of the Stockholm Museum.

[2] In allusion to the shape of the head.

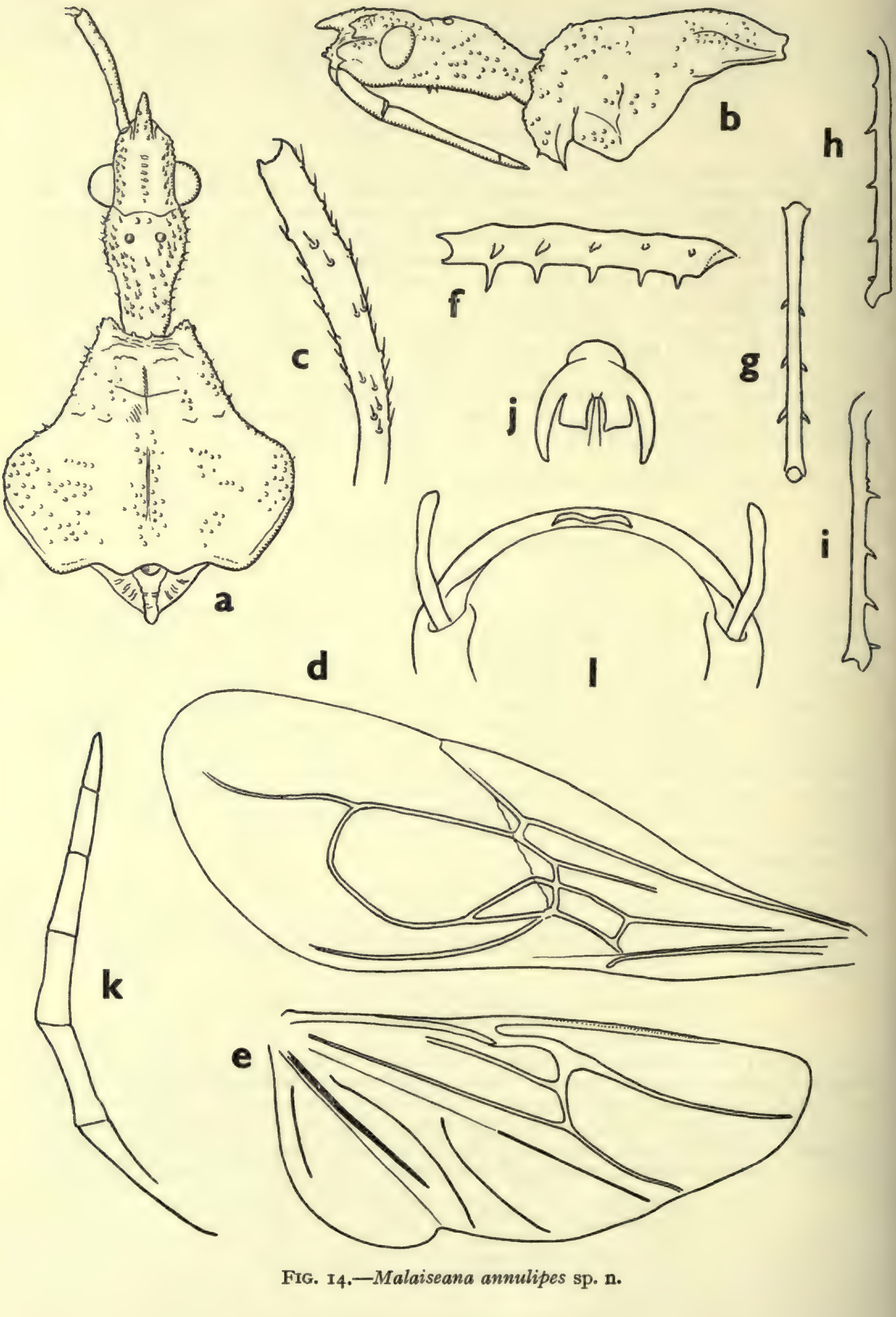
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FIG. 14.—*Malaiseana annulipes* sp. n.

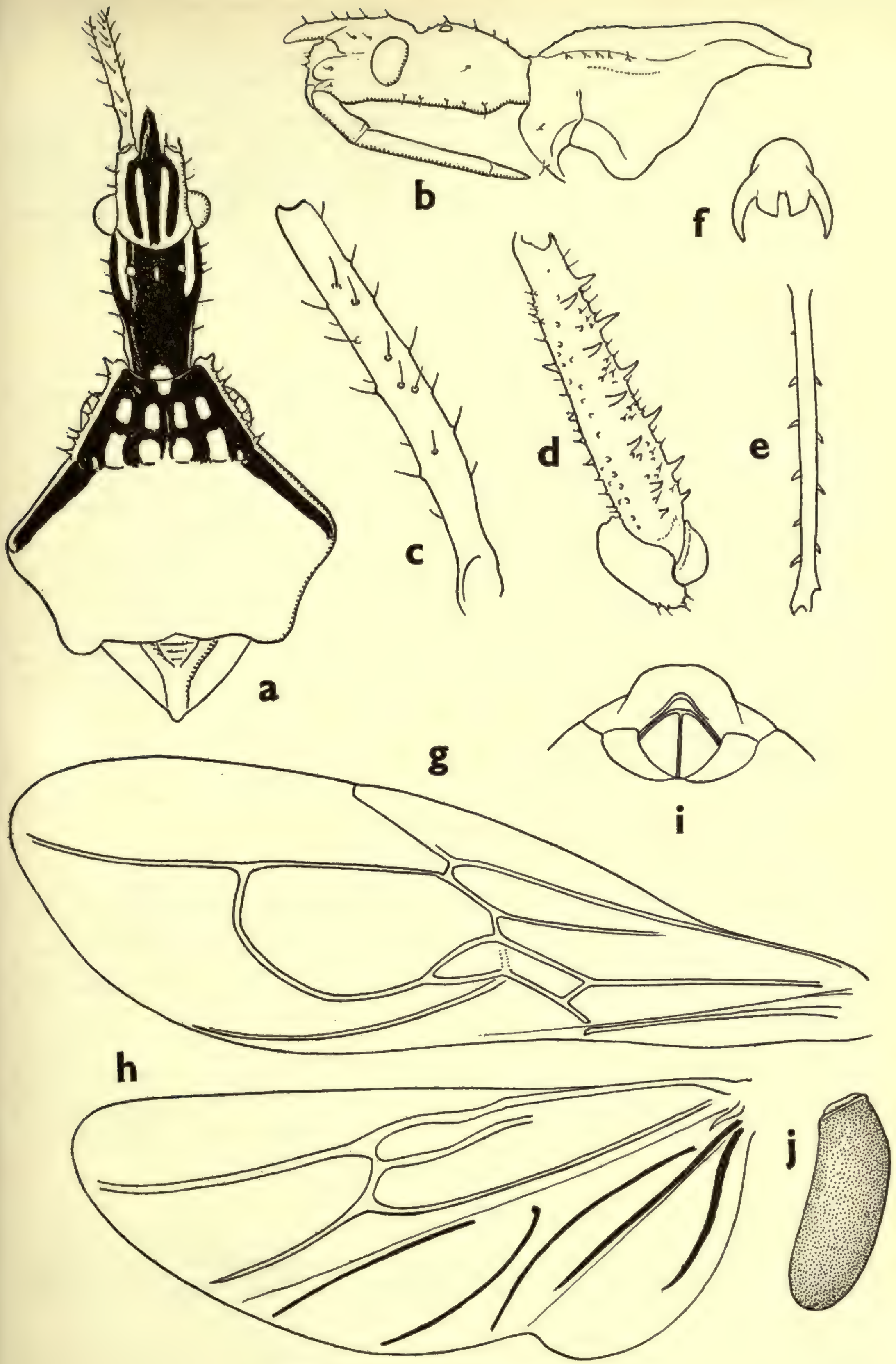
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FIG. 15.—*Tapirocoris limbatus* sp. n.

anterior lateral angles acutely produced ; posterior margin of posterior lobe undulate ; anterior lobe with a median, longitudinal sulcus. Scutellum longer than wide ; apex produced. Hemelytra with internal cell of membrane very small. Femora smooth, tuberculate ; anterior femora with spines on upper and lower surfaces ; median femora with spines on lower surface ; anterior tibiae with spines on lower surface ; anterior coxae tuberculate. External apical angle of connexival segments 5 and 6 produced.

Type species : *Tapirocoris limbatus* sp. n.

Tapirocoris limbatus sp. n.

(Fig. 15)

Colour : Testaceous. Head with three longitudinal stripes on vertex, produced portion of vertex, postocular, except a spot basally, a spot between ocelli, and an elongate spot laterally, pattern on anterior lobe of pronotum, sub-lateral area of posterior lobe, disc of scutellum, spots on coxae and pleura, shining black. Abdomen dorsally suffused with red ; connexival segments with a large piceous spot ; abdomen ventrally, meso- and metapleura with sparse small brown spots. Base of veins of metathoracic wing suffused with red. Tubercles and spines on legs piceous.

Structure. Basal segment of antennae with short, sub-erect setae arising from tubercles. Produced portion of vertex sub-acute apically, curved downwards feebly ; sides feebly convex. Vertex with a few low tubercles in linear rows on vertex and a few on vertex laterally ; transverse sulcus wide. Ocellar interspace a little less wide than distance between an ocellus and an eye. Posterior lobe of pronotum feebly, transversely rugose. Disc of scutellum depressed and transversely sulcate ; apex very feebly produced. Hemelytra extending beyond apex of abdomen. Anterior tibiae with 6 spines on outer and 5 spines on inner surface. External apical angle of connexival segments 5 and 6 feebly produced, rounded.

Total length, 12·50 mm.
Hemelytra, 8·50 mm.
Greatest pronotal width, 3·50 mm.

1♀ (holotype), Burma, Ruby Mines (*Doherty*) (B.M. 1911–383).

Key to *Dicrotelus*, *Nyllius*, *Orgetorixa* and Allied Genera

1. Brachypterous. Body narrow, elongate. Head and thorax without tubercles. Segment 9 of abdomen in female strongly lobately produced . *Dicrotelus* Erichson.
–. Fully alate. Body elongate elliptical. Head and thorax tuberculate. Segment 9 of abdomen in female moderately lobately produced . . . . 2.
2. Internal cell of membrane absent . . . . *Orgetorixa* China.
–. Internal cell of membrane present . . . . 3.
3. Internal cell of membrane small, elongate, triangular . . . . *Nyllius* Stål.
–. Internal cell of membrane very small . . . . 4.
4. Connexivum strongly tuberculate . . . . *Neonyllius* gen. nov.
–. Connexivum with a large tubercle at external apical angle of segments . . . 5.
5. Segments 7 and 9 of connexivum produced, broadly rounded . . *Paranyllius* gen. nov.

Nyllius Stål

Nyllius Stål, 1859, *Öfv. Vet. Ak. Förh.* **16** (8) : 365.
Nyllius Wygodzinsky, 1950, *Proc. Linn. Soc., N.S.W.* **75** : 87.

Corpus elongatum. Caput cylindricum, inter antennas sat longe spinoso productum. Antennae geniculatae, articulo I capite paullo breviore, crassiusculo, reliquis gracilibus. Rostrum articulo *basali brevi, secundo illo duplo longiore. Thorax medio constricto, lobo antico multi-spinuloso, postico ante scutellum sat profunde sinuato, angulis lateralibus horizontaliter extrorsum spinoso-productis. Scutellum apice acute productum. Tegmina alaeque completa. Pedes mediocres, femoribus anticis incrassatis, posticis sub-aequelongis, subtus infra medium spina armatis ; tibiis anticis femoribus sub-brevioribus. Abdomen margine spinulis obtusiusculis instructo ; segmento apicali producto fisso.*

Dicrotelo affine genus, corpore aspero, thorace constricto tegminibus completis distinctum.

Nyllius asperatus Stål

(Fig. 16)

Nyllius asperatus Stål, 1859, *Öfv. Vet. Ak. Förh.* **16** (8) : 366.

Testaceus vel fusco testaceus, parce sericeus.

Stål's description quoted above omits reference to the following characters :

Produced portion of vertex acute apically in lateral view ; produced portion of tylus somewhat narrow, rounded apically. Tubercles on head moderately long, slender. Spines on collar, on anterior lobe of pronotum and at humeral angles, slender, sub-acute. Produced portion of scutellum with erect, conical elevation apically ; apex sub acute and somewhat curved downwards ; disc narrowly deeply depressed ; carinae moderately strongly tuberculate. Hemelytra extending almost to apex of abdomen.

Stål's colour description does not agree with that of the type which is ferruginous with the corium paler. Additional colour details are, clavus and membrane infumate, connexival tubercles white and black, abdomen mid-ventrally pale testaceous.

Another specimen, without any locality label, but with a paratype label, differs from the type in having only one membranal cell and is much paler in coloration.

Total length, 11·00 mm.

Hemelytra, 6·50 mm.

Greatest pronotal width, 2·00 mm.

Stål's type, a female in the Stockholm Nat. Riksmuseum, is labelled Nova Hollandia, without precise locality.

Paranyllius gen. nov.

Size small. Basal segment of antennae shorter than head. Head longer than pronotum ; almost smooth with very sparse tubercles ; vertex and tylus produced. Ocelli small. Basal segment of rostrum extending to middle of eyes. Pronotum wider than long ; anterior lobe longer than posterior lobe ; lateral angles of collar and humeral angles produced ; both lobes smooth with a few tubercles ; posterior lobe with carinae sub-dorsally, anteriorly ; posterior margin excised. Scutellum longer than wide ; produced apically ; carinae of disc tuberculate. Hemelytra not extending to apex of abdomen ; internal cell of membrane very small. External apical angle of connexival segments 2–6 tuberculately produced ; external apical angle of segments 7 and 9 lobately produced ; abdomen ventrally tuberculate. Anterior femora incrassate and with a spine on lower surface, sub-apically ; all femora with a few tubercles ; anterior and median tibiae shorter than femora.

Type species : *Paranyllius turneri* sp. n.

Paranyllius turneri sp. n.

(Fig. 17)

Colour : Testaceous. Metathoracic wings hyaline with testaceous venation. Apex of produced portion of vertex, apical segment of rostrum, annulations on anterior and median tibiae, brown. Tubercles on connexivum black. Setae and pubescence greyish.

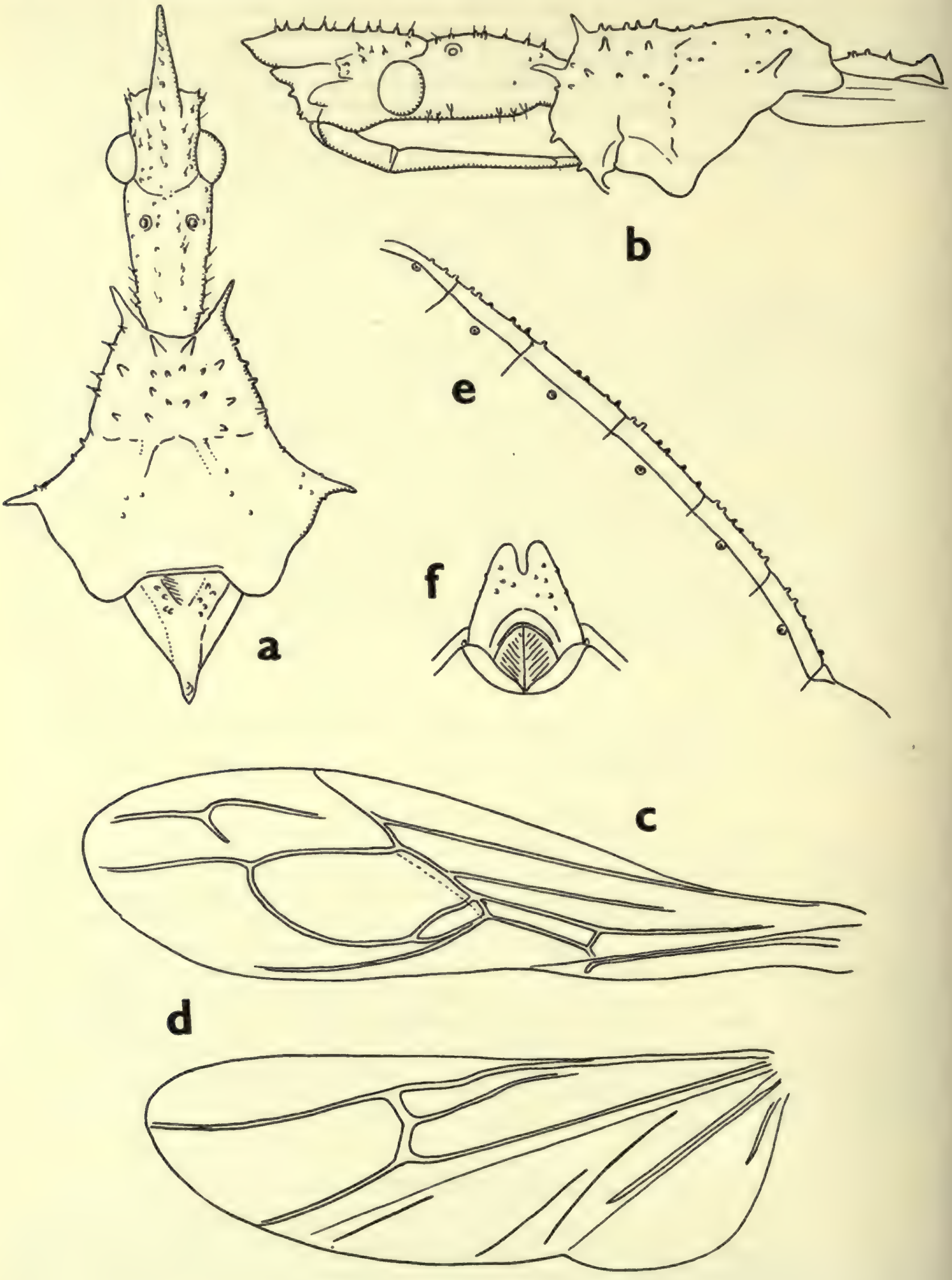

FIG. 16.—*Nyllius asperatus* Stål.

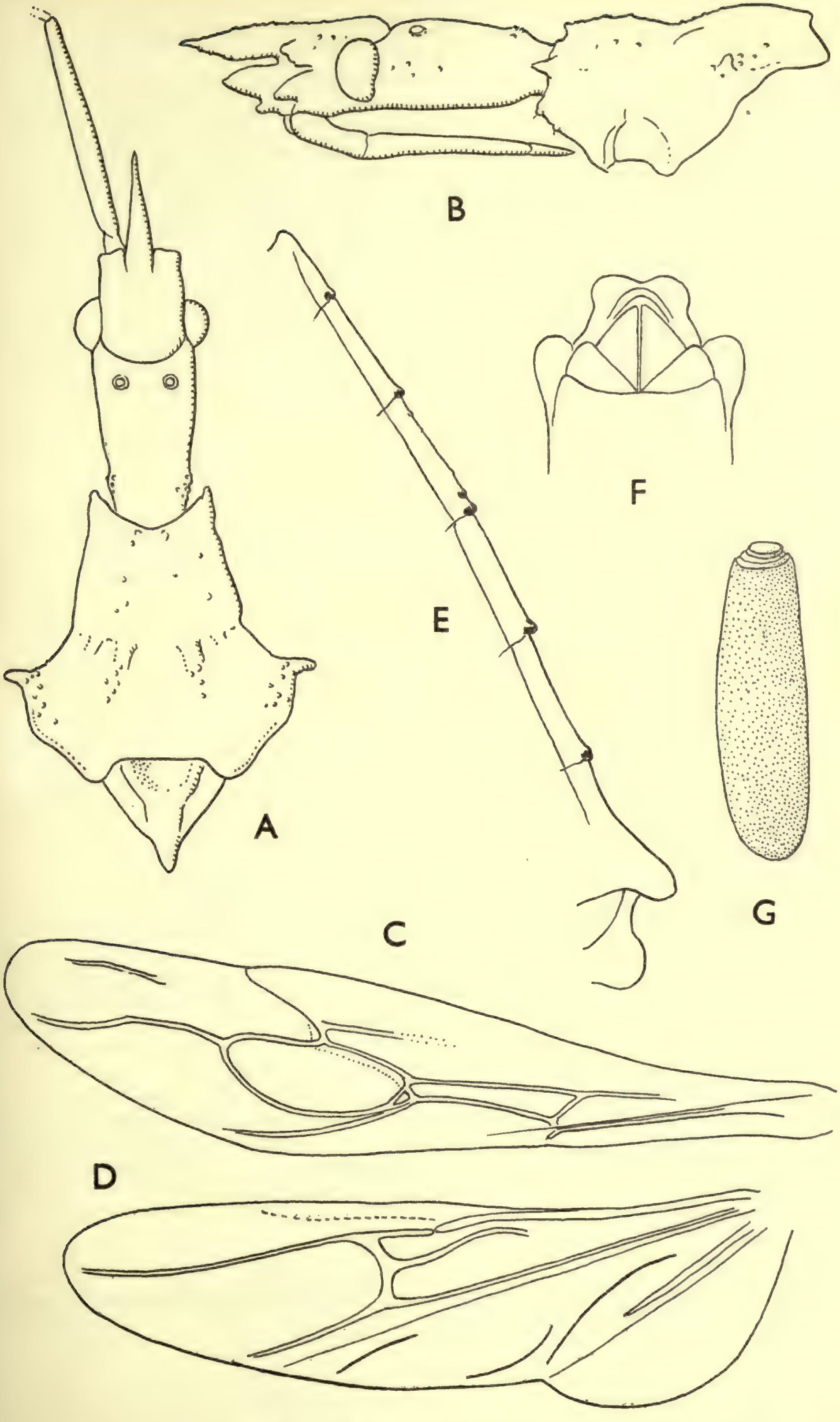

Fig. 17. *Paranyllius turneri* sp. n.

Structure. Basal segment of antennae a little more than twice as long as produced portion of vertex with a few rounded tubercles, sparse setae and dense adpressed setae; segment somewhat narrower basally and apically. Produced portion of vertex in dorsal and lateral view acute apically; produced portion of tylus in lateral view triangular, acute; antennal tubercles with minute setigerous tubercles. Head more or less smooth with very obscure, low tubercles, mainly on postocular, sub-basally; post-ocular feebly constricted in basal third. Lateral angles of collar conical, narrow, rounded apically and directed anteriorly; tubercles on anterior lobe of pronotum obscure; carinae on posterior lobe feeble with a few tubercles; lateral angles of lobe moderately strongly tuberculate; spines on humeral angles short, sub-acute; excision on posterior margin of posterior lobe wide. Disc of scutellum very feebly depressed; produced portion acute apically and rounded dorsally; tubercles on carinae very feeble. Hemelytra extending to apex of 7th abdominal segment. Tubercles on connexivum thick, rounded apically. Produced portion of segments 7 and 9 thick, rounded; tubercles on abdomen ventrally very sparse, low, rounded. Spine on lower surface of anterior femora very short, conical, thick.

Total length, 11·00 mm.
Hemelytra, 6·00 mm.
Greatest pronotal width, 2·10 mm.

1♀ (holotype), W. Australia, Yanchep, 32 m. N. of Perth, 29.i–8.ii.1936 (*R. E. Turner*) (B.M. 1936–28). An ovum extracted from this specimen is cylindrical, very feebly curved. Operculum with a circular elevation. Total length, 2·00 mm.

Paranyllius pudicus sp. n.

(Fig. 18)

Colour: Basal segment of antennae, head and thorax dark ferruginous; remaining segments of antennae light brown. Rostrum light brown. Abdomen dorsally brown; tubercles on connexivum black; abdomen ventrally testaceous. Corium ferruginous; membrane hyaline; venation testaceous. Legs testaceous; anterior and median tibiae with somewhat obscure dark brown annulations. Pubescence whitish.

Structure: Basal segment of antennae a little more than twice as long as produced portion of vertex with dense adpressed setae and sparsely tuberculate, the tubercles low, rounded and with sub-erect setae; segment somewhat narrower basally and apically. Produced portion of vertex in dorsal and lateral view acute; produced portion of tylus narrowly rounded apically and with short tubercles. Head sparsely tuberculate and with dense pubescence particularly sub-basally; postocular very feebly constricted sub-basally. Lateral angles of collar irregularly tuberculate; pronotum smooth with two moderately long tubercles anteriorly and with sparse low tubercles; anterior lobe a little longer than posterior lobe; posterior lobe feebly medially depressed anteriorly and with a feeble carina on each side of depression; spines at humeral angles short, thick, rounded apically; excision on posterior margin wide. Disc of scutellum very feebly depressed; tubercles on carinae moderately large; apex sub-acute and curved downwards feebly. Hemelytra extending just beyond apex of 7th abdominal segment; internal cell of membrane very small, narrowly triangular. Tubercles on connexivum moderately long rounded apically; produced portion of segments 7 and 9 narrowly rounded. Spine on lower surface of anterior femora narrowly conical, sub-acute.

Total length, 10·00 mm
Hemelytra, 6·00 mm.
Greatest pronotal width, 2·00 mm.

1♀ (holotype), S.W. Australia, Yalingup, 1–12 Dec.; 1♀ (paratype), same locality, Nov., 1913 (*R. E. Turner*) (B.M. 1914–190).

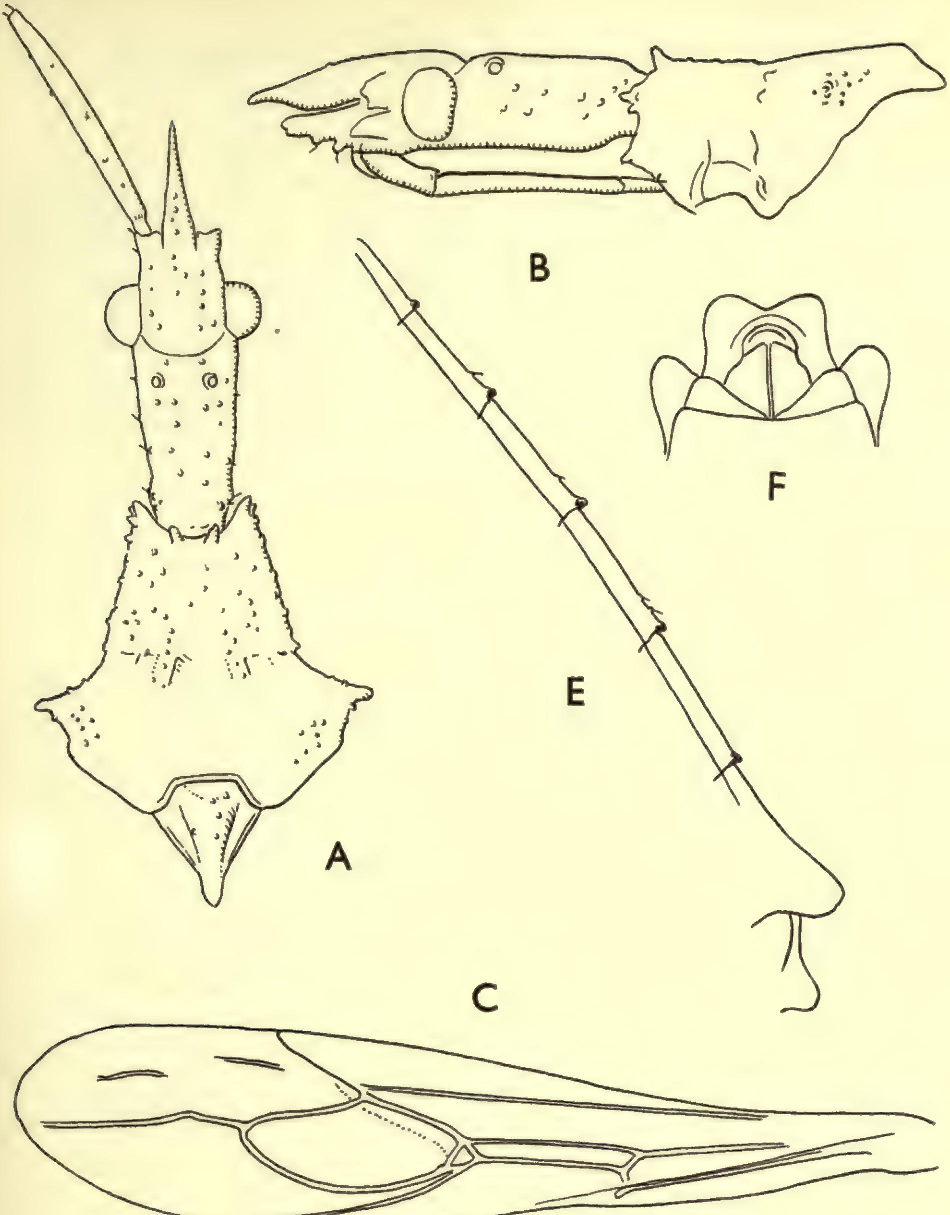

Fig. 18.—*Paranyllius pudicus* sp. n.

Neonyllius gen. nov.

Size small. Basal segment of antennae shorter than head with a few setigerous tubercles; segment 2 half as long as I; segment 3 a little shorter than 2. Head longer than pronotum; vertex and tylus produced; vertex and postocular dorsally and laterally with setigerous tubercles. Ocelli small, elevated. Basal segment of rostrum extending to middle of eyes. Both lobes of pronotum with setigerous tubercles; humeral angles and lateral angles of collar spinously produced; posterior lobe carinate anteriorly, sub-dorsally; posterior margin excavate. Disc of scutellum depressed; lateral carinae tuberculate; apex produced, acute and with a vertical conical elevation. Membrane with internal cell very small. External margins of connexival segments tuberculate; apical margin of 7th abdominal segment medially excised. Anterior femora moderately incrassate with a spine on lower surface sub-apically; all femora tuberculate. Segment 9 of abdomen in female lobately produced apically.

Type species: *Neonyllius echinus* sp. n.

Neonyllius echinus sp. n.

(Fig. 19)

Colour: Basal segment of antennae testaceous with obscure ferruginous annulations; remaining segments brown or slightly ferruginous. Segments 1 and 2 of rostrum testaceous; apical segment piceous. Head, anterior lobe of pronotum, propleural episternum, meso- and metapleura and sterna, piceous; tubercles ferruginous; posterior lobe of pronotum, propleural epimeron and acetabula testaceous. Abdomen dorsally brown; connexivum yellowish white with tubercles on apical portion of each segment, black; abdomen ventrally testaceous; tubercles light brown. Corium testaceous faintly suffused with ferruginous; apex black; membrane hyaline, faintly infumate. Femora testaceous with suffusion and tubercles ferruginous; tibiae with obscure brownish annulations; tarsi light brown. Pubescence whitish.

Structure: Basal segment of antennae almost thrice as long as produced portion of vertex; tubercles mostly in basal half. Produced portion of vertex in dorsal view acute apically; in lateral view triangular; produced portion of tylus in lateral view sub-acute apically, conical and with moderately long setigerous tubercles. Spines on collar slender; on humeral angles moderately thick, rounded apically and with setigerous tubercles; tubercles on both lobes of pronotum moderately long and thick; excavation on posterior lobe of pronotum very wide. Tubercles on connexivum moderately long, thick, irregularly spaced; median incision on 7th abdominal segment feeble. Spine on lower surface of anterior femora short, acute. Lobes on 9th abdominal segment moderately long, rounded apically.

Total length: ♂, 10·00 mm.; ♀, 11·00 mm.
Hemelytra: ♂, 5·50 mm.; ♀, 6·50 mm.
Greatest pronotal width: ♂, 2·70 mm.; ♀, 3·00 mm.

1♂ (holotype), 1♀ (paratype), Australia, Queensland, ex coll. Fruhstorfer (Vienna Museum). The ovum of this species, dissected from the paratype is cylindrical, narrowed towards the opercular end and with one side almost straight. The operculum has a short cylindrical elevation in the middle. Total length, 2·20 mm.

Key to Species of *Orgetorixa*

1. Head, pronotum, segments 2 and 3 of abdomen dorsally black . . . . 3.
-. Head, pronotum, segments 2 and 3 of abdomen dorsally dark brown . . . 2.

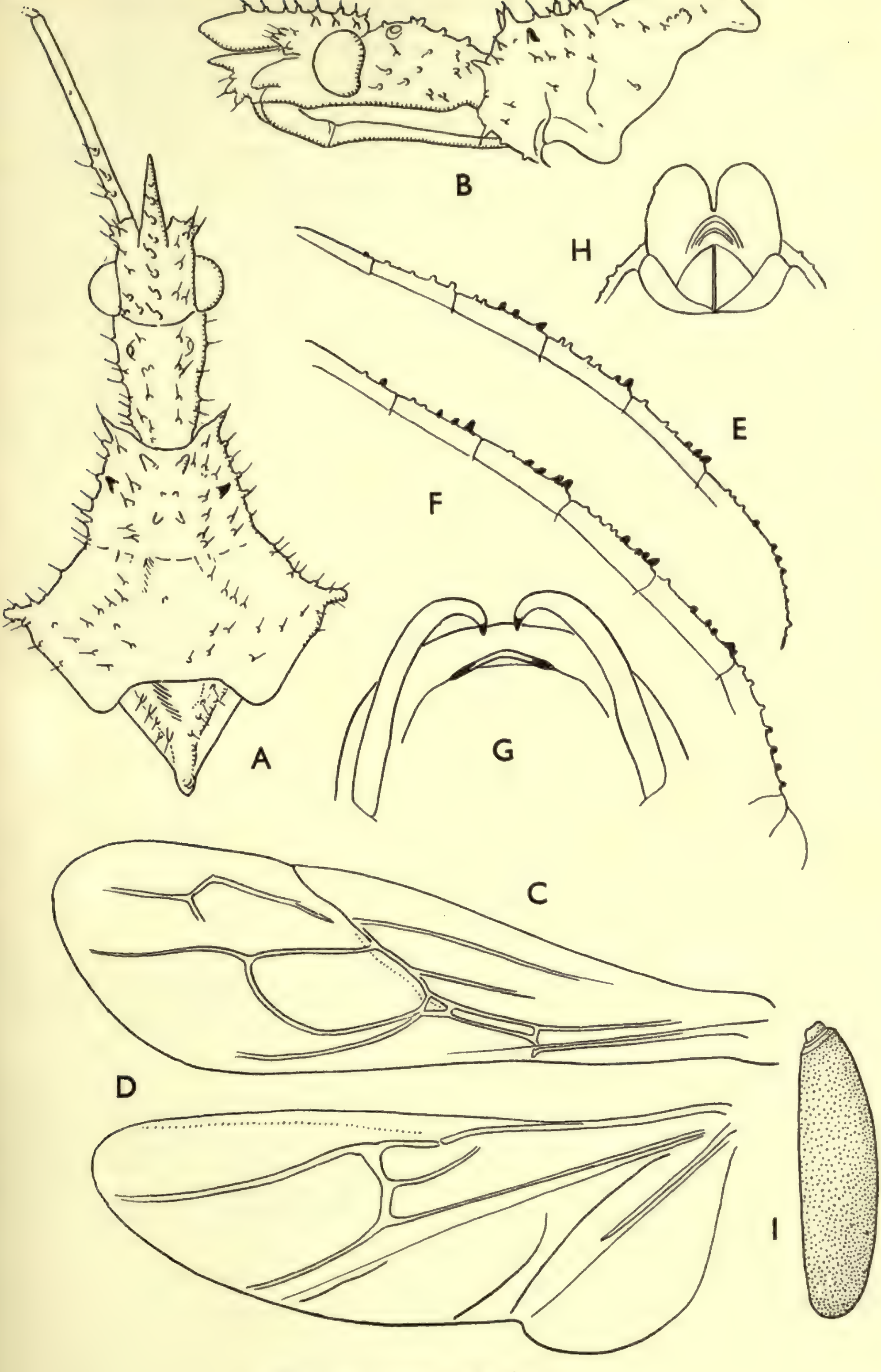

FIG. 19.—*Neonyllius echinus* sp. n.

2. Tubercles on head large, rounded ; anterior tubercles on anterior pronotal lobe and humeral spines thick, rounded apically, somewhat recurved ; spines on collar moderately thick, sub-acute, directed more or less forwards . . . ***saeva*** sp. n.
–. Tubercles on head small, rounded ; anterior tubercles on anterior pronotal lobe and humeral spines less thick, shorter, rounded apically ; spines on collar slender, acute, oblique . . . . *australica* China.
3. Tubercles on head small, conical ; anterior tubercles on anterior pronotal lobe short, rounded apically ; spines on collar moderately thick, sub-acute, oblique . ***evansi*** sp. n.

Wygodzinsky, 1950 (*Proc. Linn. Soc. N.S.W.*, **75** : 87) in referring to *Orgetorixa* states that " There is nothing in China's description that would differentiate his *Orgetorixa* from Stål's *Nyllius*. It is possible that China's only species *australicus* (*sic*) is different from *Nyllius asperatus* Stål considering its larger size. We therefore maintain China's species for the time being."

I have been able to compare the type of *Nyllius asperatus* with the type of *Orgetorixa australica* and am convinced that China's genus should be maintained. The differences between the two genera are :

	Orgetorixa	*Nyllius*
Basal segment of antennae	Longer than head	Shorter than head.
Postocular	Strongly constricted basally	Feebly constricted basally.
Basal segment of rostrum	Extending a little beyond middle of eyes	Extending just beyond anterior margin of eyes.
Scutellum	Carinae feebly tuberculate ; apical spine acute, rounded dorsally	Carinae strongly tuberculate; apical spine with conical elevation dorsally.
Connexivum	Feebly tuberculate	Strongly tuberculate.
Internal cell of membrane	Absent	Present.
Produced 9th segment of abdomen	Lobes short, rounded	Lobes lamellate, sub-acute.
Tylus	Produced ; laterally compressed	Tuberculate.

Orgetorixa evansi sp. n.

(Fig. 20)

Colour : Antennae, rostrum, legs testaceous. Head, anterior lobe of pronotum, and scutellum, black ; posterior lobe piceous ; spines and tubercles on both lobes of pronotum and apex of scutellum, ferruginous. Corium ferruginous ; clavus and membrane hyaline, pale infumate. Prosternum testaceous ; meso- and metasternum black. Abdomen testaceous ; segments 1, 2 and 3 dorsally black. Pubescence grey.

Structure : Produced portion of vertex sub-acute apically in lateral view ; produced portion of tylus obliquely truncate with low tubercles and a longer tubercle at lower angle. Head sparsely tuberculate ; lateral spines on collar moderately thick, sub-acute. Spines on anterior lobe of pronotum medially anteriorly rounded apically and somewhat constricted medially ; both lobes with sparse tubercles. Disc of scutellum moderately deeply depressed ; lateral carinae irregularly tuberculate ; apex sub-acute ; in lateral view, rounded. External margins of connexivum with a few small tubercles in apical half of each segment. Hemelytra extending just beyond apex of abdomen.

Total length : ♂, 11·50 mm. ; ♀, 13·50 mm.
Hemelytra : ♂, 7·30 mm. ; ♀, 8·00 mm.
Greatest pronotal width (excluding spines) : ♂, 2.00 mm. ; ♀, 2·50 mm.

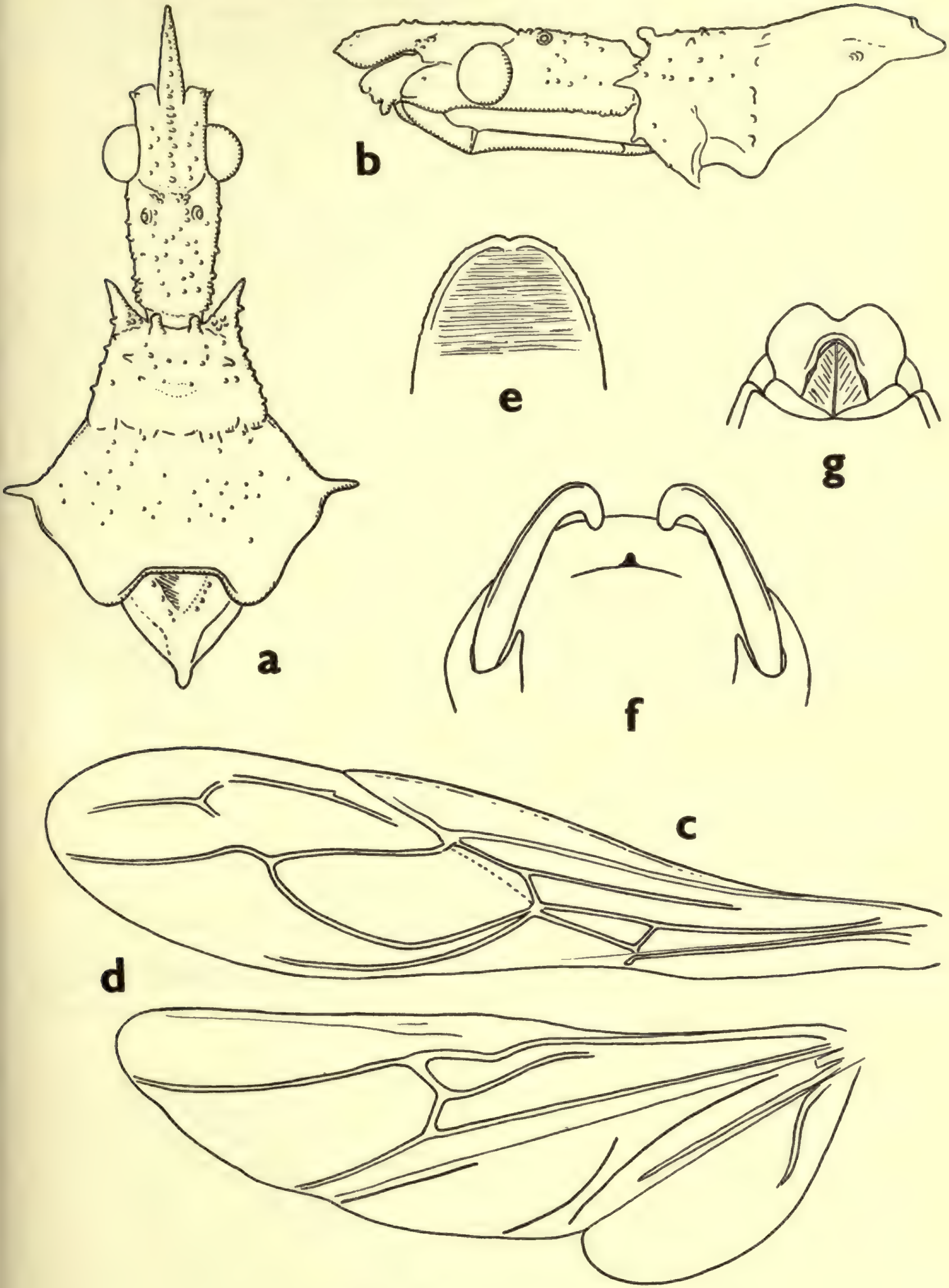

FIG. 20.—*Orgetorixa evansi* sp. n.

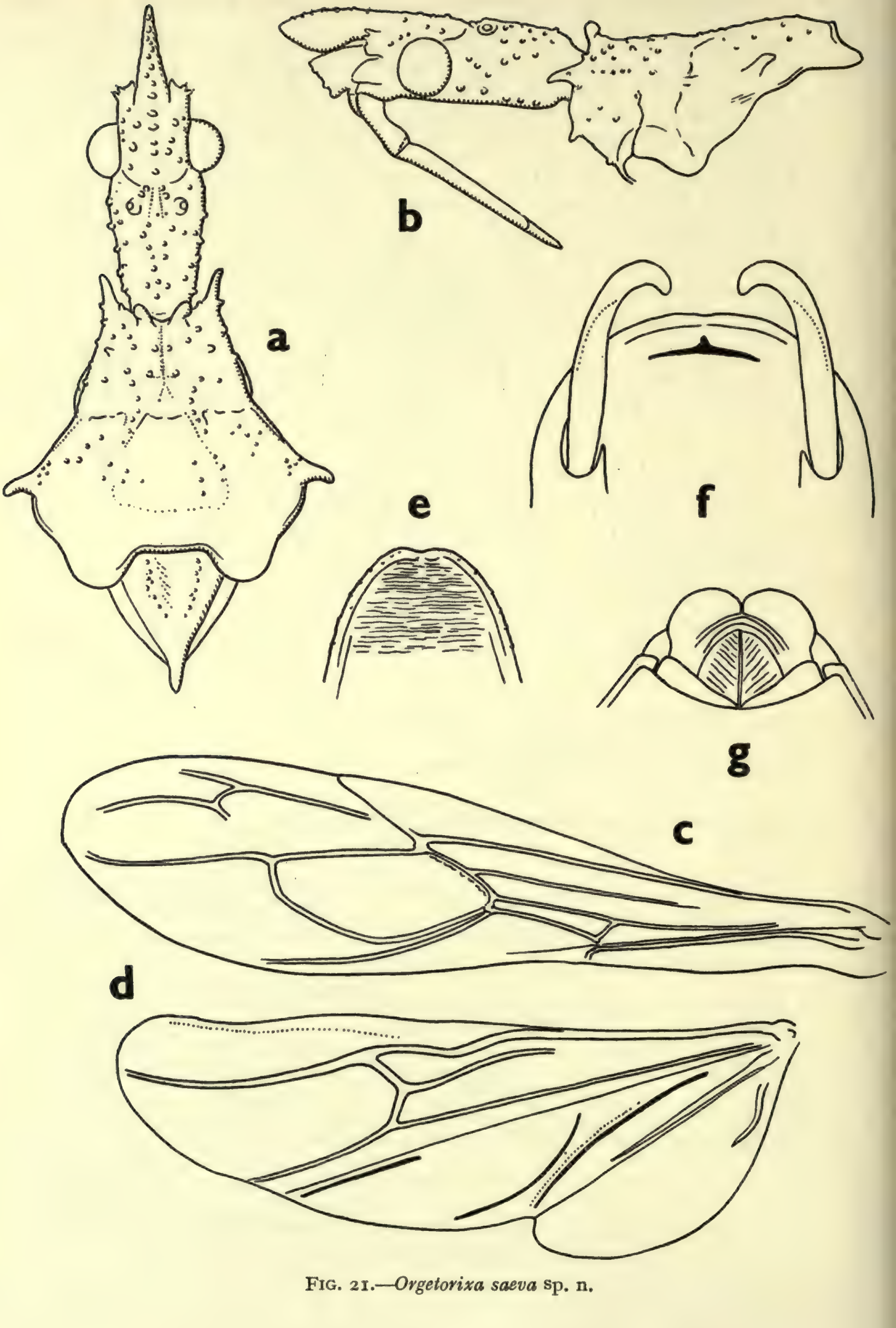

FIG. 21.—*Orgetorixa saeva* sp. n.

1♂ (holotype), Tasmania, New Norfolk, 31.x.1935; 1♀ (paratype), Margate, ii.1936 (*J. W. Evans*) (B.M. 1948–352).

Orgetorixa saeva sp. n.

(Fig. 21)

Colour: Basal segment of antennae pale ferruginous with pale testaceous annulations; segment 2 pale ferruginous; remaining segments light brown. Head, pronotum, propleura brownish ferruginous with tubercles pale ferruginous. Rostrum light brown; apical segment suffused with ferruginous. Scutellum ferruginous with apex testaceous. Meso- and metapleura, sterna, and abdomen ventrally, light brown with faint ferruginous suffusion; abdomen dorsally yellowish. Corium ferruginous with yellowish suffusion apically; clavus and membrane hyaline, faintly infumate. Femora ferruginous; tubercles darker; tibiae brown with faint ferruginous suffusion.

Structure: Produced portion of vertex in lateral view broadly conical; produced portion of tylus truncate, minutely tuberculate. Tubercles on head sparse, moderately large. Tubercles on collar, anterior lobe of pronotum anteriorly and on humeral angles, thick, rounded apically; anterior lobe feebly, transversely, depressed medially; posterior lobe with feeble carinae anteriorly, sub-dorsally and feebly depressed between carinae; posterior lobe sparsely tuberculate. Disc of scutellum feebly depressed; carinae feebly tuberculate; apex acute and somewhat curved downwards; rounded dorsally. Hemelytra extending just beyond apex of abdomen. Connexivum marginally with feeble tubercles.

Total length: ♂, 12·50 mm.; ♀, 14·00 mm.
Hemelytra: ♂, 7·30 mm.; ♀, 7·50 mm.
Greatest pronotal width (excluding spines): ♂, 3·00 mm.; ♀, 3·40 mm.

1♂ (holotype), 1♀ (paratype), Australia, N.S. Wales, Dorrigo (*W. Heron*) (B.M. 1934–232).

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REVISIONAL NOTES ON THE GENUS *EPITOLA* WESTWOOD (LEPIDOPTERA: LYCAENIDAE)

By PATRICK ROCHE

THE genus *Epitola* was established by Westwood in 1852 for *Papilio posthumus*, a species described by Fabricius as long ago as 1793. Since that date a large assemblage of species has been added. The species are all found in the great tropical forest belt of Africa, extending from Sierra Leone in the West to Uganda in the East. Although many species are widespread through this area, they nearly all tend to show extreme localization, often being found on and around one twig on one tree and not being seen again for many miles when a second " pocket " may be encountered. For this reason and because they usually fly rather high and erratically many species are poorly represented in collections, and in the future they will probably prove to be commoner than at present appears to be the case.

The genus as treated by Aurivillius in Seitz (*Macrolepidoptera of the World*, Vol. XIII) contained two species which have since been included in other genera : *honorius* Fabricius is referable to *Aethiopana* Bethune-Baker and *ernesti* Karsch to *Egumbia* Bethune-Baker.

Marked sexual dimorphism is the rule in *Epitola*. Of many species only the male is known, while in the majority the males have yet to have proved their connection with their respective females. This can only be done either by breeding or by catching the species *in copula*. It has been found that the fine distinctions in the pattern of the undersides and, even more, reliance upon locality and date of capture lead to gross inaccuracy. It is considered that our knowledge of the females is still too limited to provide a key for their differentiation. The key which follows is designed, therefore, solely as an aid to the identification of the males. It may be stated, however, that the division of the genus into groups of species according to the general appearance of the male underside appears to be a sound natural classification in that the upperside pattern of those females which are known enables them to be classified into similar groups. *E. lamborni* Bethune-Baker is known only in the female, so that this species has been omitted from the key.

The chitinized portion of the male genital armature is of a simple type, and the dissection and examination of a considerable number failed to reveal any reliable characters upon which the differentiation of the species could be based.

Acknowledgments

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CHECK-LIST OF THE SPECIES OF *EPITOLA*

1. *crippsi* Stoneham, 1933, *Bull. Stoneham Mus.* **17** : 1.
2. *hewitsoni* Mabille, 1877, *Bull. Soc. Zool. Fr.* **2** : 221 (= *falkensteini* Dewitz).
3. *hewitsonioides* Hawker-Smith, 1933, *Stylops* **2** : 11.
4. *miranda* Staudinger, 1889, *Ent. Nachr.* **15** : 176.
   ssp. *vidua* Talbot, 1935, *Ent. mon. Mag.* **71** : 75.
5. *posthumus* Fabricius, 1793, *Ent. Syst.* **3**(1) : 149 (♂ = *elion* Doubleday & Hewitson, ♀ = *belli* Hewitson).
6. *urania* Kirby, 1887, *Ann. Mag. nat. Hist.* (5) **19** : 441.
   ssp. *tanganikensis* Joicey & Talbot, 1921, *Bull. Hill. Mus.* **1** : 86.
7. *crowleyi* Sharpe, 1890, *Ann. Mag. nat. Hist.* (6) **6** : 106.
8. *semibrunnea* Bethune-Baker, 1916, *Ibid.* (8) **17** : 378 (= *ammon* Joicey & Talbot, 1921).
9. *ceraunia* Hewitson, 1879, *Ent. mon. Mag.* **10** : 149 (= *dewitzi* Kirby).
10. *adolphi-friderici* Schultze, 1911, *Iris* **25** : 95.
11. *dunia* Kirby, 1887, *Ann. Mag. nat. Hist.* (5) **19** : 441.
12. *carcina* Hewitson, 1873, *Ent. mon. Mag.* **10** : 150 (♀ = *kholifa* Bethune-Baker, 1904, and *entebbeana* Bethune-Baker, 1926).
13. *flavoantennata* sp. nov.
14. *badura* Kirby, 1890, *Ann. Mag. nat. Hist.* (6) **6** : 271.
15. *marginata* Kirby, 1887, *Ibid.* (5) **19** : 443.
   var. *umbratilis* Holland, 1890, *Psyche* **5** : 425.
16. *tumentia* Druce, 1910, *Proc. zool. Soc. Lond.* 366.
17. *congoana* Aurivillius, 1923, Ergebn. zweit. Deutsch. Zentr. Afr. Exped. 1910–11, *Zool.* **17** : 1202.
18. *leonina* Staudinger, 1888, *Exot. Tagf.* **1** : 268.
19. *elissa* Grose-Smith, 1898, *Novitates Zoologicae* **5** : 354 (= *oniensis* Bethune-Baker, 1913).
20. *uniformis* Kirby, 1887, *Ann. Mag. nat. Hist.* (5) **19** : 445.
21. *zelza* Hewitson, 1873, *Ent. mon. Mag.* **10** : 151 (= *badia* Kirby, 1887).
22. *ikoya* sp. nov.
23. *cercene* Hewitson, 1873, *Ent. mon. Mag.* **10** : 150.
24. *moyambina* Bethune-Baker, 1903, *Ann. Mag. nat. Hist.* (7) **12** : 330.
25. *cercenoides* Holland, 1890, *Psyche* **5** : 424 (= *batesi* Druce, 1910).
26. *katherinae* Poulton, 1929, *Trans. ent. Soc. Lond.*, **77** : 494.
27. *dorothea* Bethune-Baker, 1904, *Ann. Mag. nat. Hist.* (7) **14** : 227.
28. *iturina* Joicey & Talbot, 1921, *Bull. Hill Mus.* **1** : 84 (= *bella* Aurivillius, 1923).
29. *rileyi* Audeoud, 1936, *Mitt.-Schweiz. ent. Ges.* **16** : 704.
30. *carilla* sp. nov.
31. *jacksoni* sp. nov.
32. *staudingeri* Kirby, 1890, *Ann. Mag. nat. Hist.* (6) **6** : 271.
   ssp. *mara* Talbot, 1935, *Ent. mon. Mag.* **71** : 75.
   ssp. *gordoni* Druce, 1903, *Ann. Mag. nat. Hist.* (7) **11** : 70.
33. *insulana* Aurivillius, 1923, Ergebn. Zweit. Deutsch. Zentr. Afr. Exped. 1910–11, *Zool.* **17** : 1203.
34. *intermedia* sp. nov.
35. *convexa* sp. nov.
36. *sublustris* Bethune-Baker, 1904, *Ann. Mag. nat. Hist.* (7) **14** : 228.

37. *mengoensis* Bethune-Baker, 1906, *Ibid.* (7) **17** : 105.
38. *subcoerulea* sp. nov.
39. *conjuncta* Smith & Kirby, 1893, *Rhop. Exot.* **23** ; *Lyc. Afr.* 86.
    ssp. *budduana* Talbot, 1937, *Trans. ent. Soc. Lond.* **86** : 62.
40. *barombiensis* Kirby, 1890, *Ann. Mag. nat. Hist.* (6) **6** : 274.
41. *dolorosa* sp. nov.
42. *nigra* Bethune-Baker, 1903, *Ann. Mag. nat. Hist.* (7) **12** : 331.
43. *mercedes* Suffert, 1904, *Iris* **17** : 53.
44. *langi* Holland, 1920, *Bull. Amer. Mus.* **43** : 217.
45. *obscura* Hawker-Smith, 1935, *Stylops* **2** : 11.
46. *ghesquierei* sp. nov.
47. *catuna* Kirby, 1890, *Ann. Mag. nat. Hist.* (6) **6** : 273.
48. *pinodes* Druce, 1890, *Ibid.* (6) **5** : 24.
49. *viridana* Joicey & Talbot, 1921, *Bull. Hill Mus.* **1** : 84.
    ssp. *radiata* Bethune-Baker, 1926, *Ann. Mag. nat. Hist.* (9) **17** : 393.
50. *orientalis* sp. nov.
51. *maculata* Hawker-Smith, 1926, *Rev. Zool. Afr.* **14** : 240.
52. *carpenteri* Bethune-Baker, 1921, *Trans. ent. Soc. Lond.* : 462.
53. *cephena* Hewitson, 1873, *Ent. mon. Mag.* **10** : 151.
54. *doleta* Kirby, 1890, *Ann. Mag. nat. Hist.* (6) **6** : 273 (= *leonensis* Bethune-Baker, 1904).
    ssp. *entebbeana* Bethune-Baker, 1926, *Ann. Mag. nat. Hist.* (9) **17** : 392. (The insect described by Bethune-Baker as the female of *entebbeana* agrees with the female of *carcina* Hewitson. The true female of *entebbeana* must, therefore, be regarded as still undiscovered.)
55. *vinalli* Talbot, 1935, *Ent. mon. Mag.* **71** : 75.
56. *pinodoides* Smith & Kirby, 1893, *Rhop. Exot.* 23. *Lyc. Afr.* : 85.
57. *concepcion* Suffert, 1904, *Iris* **17** : 54.
58. *gerina* Hewitson, 1878, *Ill. Diurn. Lep. Suppl.* : 19 (= *zelica* Kirby, 1890, and *goodi* Holland, 1890).
59. *lamborni* Bethune-Baker, 1921, *Trans. ent. Soc. Lond.* : 461.
60. *virginea* Bethune-Baker, 1904, *Ann. Mag. nat. Hist.* (7) **14** : 230.
61. *nitide* Druce, 1910, *Proc. Zool. Soc. Lond.* : 366.
62. *albomaculata* Bethune Baker, 1903, *Ann. Mag. nat. Hist.* (7) **12** : 329.
63. *daveyi* sp. nov.
64. *liana* sp. nov.

KEY TO THE GROUPS OF SPECIES

1. Under surface of hind wing with black punctiform spots at the base . *hewitsoni* group
–. Under surface of hind wing without black punctiform spots at the base . . 2.
2. Under surface with longitudinal dark streaks between the viens . . *posthumus* group
– Under surface without dark streaks between the veins . . . . . . 3.
3. Under surface of fore wing with a longitudinal dark area in the posterior half of the wing extending from the base nearly to the margin (Figs. 26, 28, 30, 32, 34, 36, 38) *pinodes* group
–. Under surface of fore wing without such a dark longitudinal area . . . . . 4.
4. Under surface with light markings on a dark ground (Figs. 2, 4, 6, 8, 10, 12, 14, 16) *carcina* group
Under surface with dark markings on a light ground (Figs. 18, 20, 22, 24) . *nitide* group

The *hewitsoni* group.

1. Upper surface black and white . . . . *crippsi*
–. Upper surface black and blue . . . . 2.
2. Pale blue. Cell of fore wing above entirely blue . . . . 3.
–. Dark blue. Cell of fore wing above entirely black . . . . . . *miranda*
3. Size larger. Hind wing strongly produced at the ends of veins 2, 3 and 5 . *hewitsoni*
Size smaller. Hind wing almost smoothly rounded . . . . *hewitsonioides*

The *posthumus* group

1. Under surface with a metallic lustre . . . 2.
–. Under surface without a metallic lustre . . . *adolphi-friderici*
2. No light markings in the cell of the fore wing beneath . . . *crowleyi*
–. Light markings present in the cell of the fore wing beneath . . . 3.
3. Cell of the fore wing above entirely blue . . . 4.
–. Cell of the fore wing above completely or nearly completely black . . . 5.
4. The black apex of the fore wing above forms a prolongation into the blue discal area opposite the end of the cell . . . *urania*
–. The junction of the blue and the black at the apex of the fore wing above is a smooth line without invasion of the blue by the black opposite the end of the cell . *posthumus*
5. Distinct blue markings present on the fore wing above . . . *ceraunia*
–. Fore wing above entirely brownish-black except for a few scattered blue scales at the extreme base . . . *semibrunnea*

The *pinodes* group

1. Distal margin of fore wing very strongly convex, almost angled at vein 4 . . . 2.
–. Distal margin of fore wing only normally curved . . . 7.
2. Fore wing above unicolorous dark brownish-black, or at most with one or two very indistinct blue spots . . . 3.
–. Fore wing above with distinct blue markings . . . 5.
3. No blue spots on the fore wing, or not more than a feeble deep violet blue sheen on the disc when viewed in a strong lateral light. Black border of the hind wing invades the blue colour at least along the veins 2 to 4, thus reducing the blue discal area 4.
–. Two very indistinct blue spots on the fore wing above. Black border of hind wing of uniform width from the anal angle to the apex, not extended inwards along the veins, the blue discal area being in consequence larger (Fig. 25) . . *subcoerulea*
4. Black border of hind wing above invades the blue discal area along veins 2 to 4. The blue colour is an iridescent violetish blue . . . *sublustris*
–. Blue discal area of hind wing above reduced to blue scaling in between the black veins. The blue colour is a colder shade and less iridescent . . . *mengoensis*
5. Size larger. Length of fore wing 18 mm. Hind wing fairly evenly scaled with blue *conjuncta*
–. Size smaller. Length of fore wing 14 mm. Blue area of hind wing reduced by black scaling on the veins . . . 6.
6. Under surface distinctly paler at the base becoming darker towards the margin, giving a scorched appearance . . . *barombiensis*
–. Under surface not markedly paler at the base (Fig. 28) . . . *dolorosa*
7. Hind wing above unicolorous brown without any blue marking . . . 8.
–. Hind wing above more or less marked with blue . . . 9.
8. Fore wing with blue spots in areas 2 and 3. . . . *nigra*
–. Fore wing with exceedingly faint traces of blue scaling in areas 6 and 7. (*N.B.*—A lens was required to detect these blue scales in Suffert's type specimen) . *mercedes*
9. Fore wing with distinct blue markings . . . 12.
–. Fore wing without distinct blue markings . . . 10.
10. Hind wing above with blue scaling in the distal half of the cell. Ground-colour of underside dark grey. Size larger (Figs. 31, 32) . . . *cephena*
—. Hind wing with diffuse blue scaling over the whole cell and surrounding areas. Ground-colour of underside not dark grey. Size smaller . . . 11.
11. Blue scales of hind wing above very scanty, giving only an indistinct blueness to the disc of the wing. Under surface rich brown with darker markings . . *obscura*
—. Hind wing above distinctly blue with a black border. Under surface pale ochreous-

grey without markings other than the usual black longitudinal area on the fore wing (Figs. 33, 34) . . . . . *ghesquierei*
12. Veins of hind wing above not or only slightly black . . . . . 13.
Veins of hind wing above heavily scaled with black . . . . . 16.
13. Dark longitudinal area on the fore wing beneath much darker than the ground-colour, the two contrasting strongly . . . . . 14.
Dark longitudinal area on the fore wing beneath not much darker than the ground-colour, with, therefore, only a slight contrast between the two . . . . *catuna*
14. Size larger. Black border of hind wing of uniform width from vein 1 to vein 7 . *doleta*
—. Size smaller. Black border of hind wing distinctly wider from the anal angle to vein 3 than from vein 3 to vein 7 . . . . . 15.
15. Fore wing above with a blue spot in area 4 . . . . . *vinalli*
Fore wing above without a blue spot in area 4 . . . . . *pinodoides*
16. Under surface marked with whitish and grey . . . . . 19.
Under surface marked with brown and fulvous . . . . . 17.
17. Under surface markings rather indistinct, especially at the apex of the fore wing . 18.
Under surface marked with fulvous on a dark brown ground, the contrast being very marked, especially at the apex of the fore wing (Fig. 36) . . . . *orientalis*
18. Blue coloration of fore wing above more pronounced, the dark-scaled vein 2 being a fine black line crossing the blue area behind the cell . . . . *pinodes*
—. Blue coloration of fore wing above less pronounced, vein 2 being so heavily scaled with black that the blue area behind the cell is divided into two spots . . *viridana*
19. Under surface ground colour brownish-grey speckled with whitish lunular markings *maculata*
Under surface ground colour pale grey heavily marked with whitish, this being the dominant colour of the hind wing (Fig. 38) . . . . . *carpenteri*

The *carcina* group

1. A triangular scent patch at base of fore wing . . . . . 2.
–. No such scent patch on the fore wing, though one or two veins may be dilated . 4.
2. Cell of fore wing above entirely blue except where it may be encroached upon in the basal posterior part by the scent patch . . . . . 3.
Cell of fore wing above contains two black spots . . . . . *dunia*
3. Extreme tip only of the antennae yellow. Scent patch on the fore wing not extending above the median vein . . . . . *carcina*
Ventro-medial aspect of the antennae yellowish almost to the base. Scent patch on the fore wing extending on to the base of the cell (Fig. 1) . . . *flavoantennnata*
4. Median vein of the fore wing much more thickened or dilated at the base than vein 1 5.
–. Vein 1 and the median vein more or less equal in width at the base . . . 13.
5. Black mark at apex of cell of the fore wing above . . . . . 7.
–. No black mark at the apex of the cell of the fore wing above . . . . 6.
6. Length of fore wing about 18 mm., the apex pointed, and the outer margin almost straight. Area 6 of the hind wing with only a few blue scales . . . *badura*
–. Length of fore wing about 16 mm., the apex squared, and the outer margin very convex. Area 6 of the hind wing fully blue scaled . . . . . *zelza*
7. Margins of the wings slightly but distinctly undulate . . . . . *marginata.*
–. Margins of the wings not distinctly undulate 8
8. Cell of fore wing entirely black except for a few scattered blue scales. Size larger, length of fore wing 18 mm. . . . . . *tumentia*
–. Cell of fore wing mainly blue. Size smaller, length of fore wing 16 mm. . . 9.
9. Costal margin of fore wing very broadly bordered with black, no blue in areas 6 and 7 10.
–. Black costal border of fore wing narrower ; base of areas 6 and 7 blue . . . 11.
10. Dark marginal band of hind wing broad . . . . . *congoana*
—. Dark marginal band of hind wing narrow . . . . . *leonina*

11. Under surface of fore wing with a white spot on the tornus . . . . . . 12.

Under surface of the fore wing without a distinct white spot on the tornus (Fig. 6) . *ikoya*

12. Upper surface of fore wing with a heavy black mark closing the apex of the cell, and in addition, two black marks in the cell . . . . *elissa*

—. Upper surface of fore wing with at most a small black streak at the apex of the cell, there being no other marking in the cell . . . . *uniformis*

13. Black markings present on the disc of the fore wing as well as the black apex, costal and distal borders . . . . 22.

—. No black markings on the disc of the fore wing except the apex, costal and distal borders . . . . 14.

14. Black mark at the apex of the cell of the fore wing . . . . 15.

No black mark at the apex of the cell of the fore wing . . . . . . 19.

15. The black mark at the apex of the cell of the fore wing is only a fine streak in the middle of the discocellular vein, and is not connected at all with the black costal border . . . . *cercene*

—. The black mark at the apex of the cell of the fore wing is triangular . . . . 16.

16. The triangular black mark at the apex of the cell of the fore wing is continuous with the black costal border . . . . *moyambina*

—. The triangular black mark at the apex of the cell of the fore wing is separated from the black costal border by a fine blue line . . . . 17.

17. The line of union of the black border and apex of the fore wing with the blue ground-colour is almost straight from vein 2 to 6, then curved, the black extending very little along the veins basad . . . . *cercenoides*

—. The blue colour of the fore wing is carried into the black border and apex conspicuously between the veins . . . . 18.

18. The white markings on the fore wing beneath less sharply outlined and the apices of the three " V's ", which form the most conspicuous feature of the pattern, are blunt and rounded. The elements of the pattern are larger and more emphasized, especially on the hind wing . . . . *katherinae*

—. The white markings on the fore wing beneath are more sharply outlined. The apices of the three " V's " sharply pointed. Elements of the pattern smaller and less distinct . . . . *dorothea*

19. Black distal border of the fore wing above becomes suddenly narrow at vein 3. Distinct light submarginal band on fore wing beneath . . . . . . *iturina*

—. Black distal border of fore wing above not suddenly narrowed at vein 3. Submarginal row of light lunules on the fore wing beneath . . . . 20.

20. Distal margin of fore wing almost a straight line from the apex to the tornus. Black distal border of the fore wing tapered to a fine marginal line at vein 3 . *insulana*

—. Distal margin of fore wing slightly but distinctly convex. Black distal border of the fore wing tapered to the tornus . . . . 21.

21. The blue colour of the fore wing above encroaches only slightly into the black apex between the veins. The distal margins of the wings are only very slightly convex (Fig. 9) . . . . *intermedia*

—. The blue colour of the fore wing extends into the black apex between the veins, giving the blue/black junction a serrated appearance. Fore wing distinctly convex at vein 5 (Fig. 11) . . . . *convexa*

22. Fore wing above with a subapical row of three white spots. Wings strongly undulate . . . . *rileyi*

—. Fore wing above without subapical white spots. Wings not undulate . . . . 23.

23. Upper surface black with distinct blue markings . . . . 24.

Upper surface unicolorous blackish, with only a faint deep violet reflection when viewed in a strong lateral light . . . . *langi*

24. Basal half of area 1*a* and the basal part of the cell of the fore wing black (Fig. 13) *carilla*

—. The cell of the fore wing and area 1*a* (except for a narrow streak along vein 2) blue 25.

25. Fore wing above with a black mark at the end of the cell joining the black discal patch with the black costal border, thus separating off a blue subapical patch (Fig. 15) . . . *jacksoni*
Fore wing above with no such black mark at the end of the cell . . . *staudingeri*

The *nitide* group

1. Upper surface unicolorous brown . . . *concepcion*
–. Upper surface more or less blue . . . 2.
2. Upper surface of fore wing occupied almost entirely by a large, circular, blackish scent patch (Fig. 17) . . . *virginea*
Upper surface of fore wing without a large scent patch . . . 3.
3. Under surface with dark markings much reduced, little or no marking in the cell of the fore wing beneath . . . *nitide*
Under surface with the dark markings well developed ; distinct dark markings in the cell of the fore wing beneath . . . 4.
4. Costal margin, apex, and distal margin of fore wing above broadly black (at least 3 mm. broad in area 5) . . . 5.
–. The black of the fore wing above reduced to a narrow black costal border, apex, and very narrow distal marginal border (less than 1 mm. broad in area 5) (Fig. 19) . *daveyi*
5. Black streak at the apex of the cell of the fore wing above (Fig. 23) . . . *liana*
–. No black streak at the apex of the cell . . . 6.
6. Dark markings on the under surface very heavily developed, a greater area being covered by the dark markings than by the light ground-colour . . *albomaculata*
–. Dark markings on the under surface not so heavily developed . . . *gerina*

DESCRIPTIONS OF NEW SPECIES

Epitola flavoantennata sp. nov.

(Pl. 19, figs. 1, 2, 3, 4)

This species is closely related to *E. carcina* Hewitson, from which it differs in the following respects : In both sexes the new species has the ventro-medial aspect of the antennae yellow almost to the base, whereas in *carcina* only the extreme tip is yellow. In the male the scent patch at the base of the fore wing is larger, covering the basal two-thirds of the cell and the base of area 1*a*, while in *carcina* the scent patch covers only the posterior part of the basal half of the cell, and is bounded posteriorly by vein 1.

Holotype male and allotype female. CAMEROONS : Bitje, Ja River, 2000 ft. (in British Museum (N.H.)).

Epitola carilla sp. nov.

(Pl. 20, figs. 13, 14)

MALE. Upper surface : fore wing blue, costal margin, apex, and distal margin black. A black patch covers the basal half of area 2 and the basal part of the cell except for a few scattered blue scales at the extreme base of the wing. This black patch is bounded posteriorly by vein 1, and anteriorly, in its distal part by vein 2 except for a narrow prolongation which extends forwards and outwards into area 3 ; the anterior boundary of the black patch in the basal part is carried obliquely across the cell parallel with vein 1. The fringes of the fore wing are mainly dark in the apical part, with an increasing amount of white towards the tornus. Hind wing unicolorous blue from vein 1 to vein 6, areas 1 and 7 being black. The fringes of the hind wing are dark tipped with white except at the ends of the veins, where the fringes are entirely dark. The under surface is identical with that of *cercene* Hewitson.

Length of fore wing : 19 mm.

Holotype male. UGANDA : Entebbe, 1905 (*E. A. Minchin*) (in British Museum (N.H.)).

Epitola jacksoni sp. nov.

(Pl. 20, figs. 15, 16)

MALE. Upper surface : on the fore wing blackening of certain veins and the black discal patch have reduced the blue colour to areas 1 and 2 and the cell entirely blue, a curved subapical row of blue spots, those in areas 3, 5, 6 and 7 being large, that in area 4 minute. The blue colour is lighter in tone than in *cercene* and other related species. The fringes of the fore wing are entirely dark. The hind wing is as in the other related species, being blue from vein 1 to vein 6, areas 1 and 7 being black. The fringes of the hind wing are dark except at the apex where they are tipped with light. The arrangement of the pattern of the under surface is as in *cercene*, but the white markings are much reduced in size.

Length of fore wing : 20 mm.

Holotype male. UGANDA : Katera, August, 1938 (*T. H. E. Jackson*) (in British Museum (N.H.)).

Epitola convexa sp. nov.

(Pl. 20, figs. 11, 12)

MALE. This species forms with *insulana* Aurivillius and *intermedia* sp. nov. (*vide infra*) a trio of very closely allied species. *E. convexa* differs from *insulana* in having the distal margin of the fore wing distinctly convex at vein 5, and the distal margin of the hind wing more or less rounded from the apex to the anal angle ; in *insulana* the distal margins of the fore wing and the hind wing are practically straight lines. The black apex of the fore wing is continued as a black distal marginal band tapering to the tornus ; in *insulana* the black apex is tapered to vein 3 behind which it is continued merely as a fine black marginal line. On the under surface *convexa* differs from *insulana* in having the submarginal row of light coloured lunules diverging inwards from the distal margin in a smooth curve ; this row of lunules in *insulana* is a straight line parallel with the distal margin from the anal angle to area 5, the lunules in areas 6 and 7 suddenly diverging inwards from the margin.

Length of fore wing : 20 mm.

Holotype male. UGANDA : Bwamba, May, 1940 (*T. H. E. Jackson*) (in British Museum (N.H.)).

Epitola intermedia sp. nov.

(Pl. 19, figs. 9, 10)

MALE : This species appears to be intermediate between *insulana* and *convexa*. The wing shape is closer to *insulana* in that the distal margin of the fore wing, though slightly rounded, has not the distinct convexity at vein 5 as seen in *convexa*. Similarly the hind wing is less rounded than in *convexa*, but not so straight as in *insulana*. The black apex of the fore wing is continued as a tapered distal marginal border as far as the tornus as in *convexa*, but in *intermedia* the blue colour does not encroach between the veins to any noticeable degree ; in *convexa* the prolongations of the blue into the black give the blue/black junction a serrated appearance. The markings of the under surface do not differ significantly from those seen in *convexa*.

Length of fore wing : 18 mm.

Holotype male. UGANDA : Katera, August, 1935 (*T. H. E. Jackson*) (in British Museum (N.H.)).

Epitola ikoya sp. nov.

(Pl. 19, figs. 5, 6, 7, 8)

MALE : Upper surface royal blue with the costa, apex and distal margin of the fore wing, and all margins of the hind wing rather broadly bordered with black (black border of costa opposite end of cell 1·5 mm. broad, the apex 6 mm., and the distal border of the hind wing 1·5 mm.). The end of the cell of the fore wing is marked by a fine black streak. Vein 2 on the fore wing is dilated at the base. The under surface is greyish-brown, very indistinctly marked with a slightly lighter tint. A marginal and submarginal row of lighter lunules are close together and extend from the apex of the fore wing to the anal angle of the hind wing. The lunules comprising these two rows are of approximately equal breadth. A curved, broken, discal line extends on the fore wing from a point on the hind margin just inside the tornus to midway along the costa, and on the hind wing from a point 2 mm. internal to the anal angle to the junction of the middle and outer one-third of the costa.

Length of fore wing : 15 mm.

FEMALE. Upper surface unicolorous sepia brown without markings. Under surface light ochreous with very faint traces of lighter markings as in the male.

Length of fore wing : 15 mm.

Holotype male and allotype female. SOUTHERN NIGERIA : Lagos, 28th October, 1946 (*P. J. L. Roche*) (in British Museum (N.H.)).

This species is close to *zelza* Hewitson (= *badia* Kirby) from which it differs in the male by having a black streak at the end of the cell on the upper surface of the fore wing, by having a slightly broader black border to the hind wing, and by the submarginal row of lunules on the under surface of the hind wing being the same width as the marginal row ; in *zelza* the submarginal lunules are twice as wide as the marginal ones. The female differs from that of *zelza* in being unicolorous brown with no blue at all on the upper surface.

Epitola subcoerulea sp. nov.

(Pl. 21, figs. 25, 26)

MALE. Upper surface : fore wing with the distal margin strongly convex at veins 3 and 4, dark brownish black with a very indistinct blue spot in area 5 and another in area 3. The hind wing is deep royal blue bordered with black. This black border is of a practically uniform width of 1 mm. The under surface is greyish-brown, the fore wing having a darker longitudinal mark extending from the base of the wing to near the margin, bounded anteriorly by vein 5 and posteriorly by vein 2. Areas 1 and 2 pale greyish-white, and with two greyish-white spots, one in area 3 and the other in area 5, corresponding exactly with the indistinct blue spots on the upper surface. Both wings with an indistinct row of marginal lunules which are slightly paler than the ground colour ; in addition there is a very faint paler discal line across the hind wing.

Length of fore wing : 17 mm.

Holotype male. SIERRA LEONE : 1898 (*Capt. Stevens*)(in British Museum (N.H.)).

This species is close to *sublustris* B.-Baker, from which it is at once distinguished by the larger blue area on the hind wing above and by the two indistinct blue spots on the upper surface of the fore wing.

Epitola dolorosa sp. nov.

(Pl. 21, figs. 27, 28, 29, 30)

MALE : Distal margin of fore wing very strongly convex at veins 3 and 4. Fore wing above pitchy, with a blue streak in area 2, a small blue spot in area 3, and a very small indistinct blue spot in area 5 ; there are a few scattered blue scales in the cell. The under surface is brown, areas 1 and 2 of the fore wing pale grey. A longitudinal dark brown mark extends along the line of the median vein from the base of the wing nearly to the distal margin ; there is a slightly paler marginal band, a paler spot in area 3 and another in area 5. The hind wing has an indistinct paler submarginal band 2·5 mm. wide.

Length of fore wing : 14 mm.

Female : Upper surface unicolorous brown except for very faint traces of pale blue spots, one in area 3 and one in area 6. The under surface has a pale ochreous ground-colour with markings arranged as in the male.

Length of fore wing : 15·5 mm.

Holotype male. UGANDA : Bwamba Forest, Semliki Valley, November, 1911 (*S. A. Neave*) (in Britsh Museum (N.H.)).

Allotype female. UGANDA : Entebbe (*S. A. Neave*) (in British Museum (N.H.)).

Epitola ghesquierei sp. nov.

(Pl. 22, figs. 33, 34)

MALE : Upper surface : Fore wing unicolorous pitchy black without any trace of blue marking ; hind wing blue from vein 1 to vein 7, with slight blue scaling in area

8 ; the black border invades the blue area along the ends of the veins ; a fine black transverse streak marks the apex of the cell. The under surface is pale ochreous-grey without any marking other than a dark greyish-brown longitudinal mark in the posterior half of the fore wing ; this mark is clearly defined anteriorly, but fades into the pale ground colour at the posterior margin of the wing. Length of fore wing 14 mm.

Holotype male. BELGIAN CONGO : Eala, November. 1936 (*J. Ghesquière*) (in Musée Royal du Congo Belge, Tervuren).

In general appearance this species recalls at first glance *sublustris* and *subcoerulea,* but is distinguished from both by the straighter margin of the fore wing.

Epitola orientalis sp. nov.

(Pl. 22, figs. 35, 36)

MALE. Upper surface of the fore wing black, with rather obscure blue markings : a streak in the basal half of area 2, a spot towards the base of area 3, three ill-defined spots in the cell, and very faint subapical spots in areas 5 and 6. The hind wing is black, dusted with blue scales between the veins from vein 1 to vein 7. The under surface of the fore wing is dark brown with a yet darker longitudinal mark in the posterior half extending from the base almost to the margin of the wing ; this mark is fairly well defined anteriorly, but posteriorly it fades to a pale greyish-brown on the posterior margin. The wing is further marked with fulvous lunular spots, a marginal row from the tornus to the apex, a submarginal row from area 3 to the costa, a subapical row and a discal row, the last two rows being confined to the anterior half of the wing, i.e., they do not invade the longitudinal dark mark. The hind wing has a very distinct broad (2 to 3 mm.) fulvous submarginal band, a fine marginal band, and three narrow transverse bands in the basal half of the wing of the same colour.

Length of fore wing : 15 mm.

Holotype male. UGANDA : Bwamba, September, 1942 (*T. H. E. Jackson*) (in British Museum (N.H.)).

This species is, above, very difficult to distinguish from *viridana* Joicey & Talbot, but a glance at the under surface is sufficient to separate the two species.

Epitola daveyi sp. nov.

(Pl. 20, figs. 19, 20 ; Pl. 21, figs. 21, 22)

MALE. Upper surface intense bright blue, the fore wing with the costal margin narrowly black ; the apex is narrowly black, and there is a very narrow black border to the distal margin of the wing. The hind wing is blue with the costal and inner margins black ; there is a very fine black distal marginal line. The under surface is very similar to that of *albomaculata* B.-Baker from which it differs by having the dark markings rather smaller and more sharply defined.

Length of fore wing : 21 mm.

FEMALE. This resembles the female of *albomaculata* from which it differs above in having an additional white submarginal spot in area 2 and in having the blue areas of both wings somewhat reduced. The under surface is similar to that of the male.

Length of fore wing: 20 mm.

Holotype male. S.E. NIGERIA: Isoba, February, 1943 (*T. F. Davey*) (in British Museum (N.H.)).

Allotype female. S.E. NIGERIA: Isoba, February, 1943 (*T. F. Davey*) (British Museum (N.H.)).

Epitola liana sp. nov.

(Pl. 21, figs. 23, 24)

MALE. The upper surface of the fore wing is blue. The costa, apex and distal margin are black. The apex of the cell is closed by a black streak joined anteriorly with the black costal border. The hind wing is blue with black costal and inner borders, and a narrow black distal border. The fringes are spotted black and white. The ground colour of the under surface of the fore wing is greyish-white with six transverse dentate dark greyish-brown lines. These lines coalesce in the posterior half of the wing which is thereby clouded with greyish-brown. The hind wing beneath has a greyish-white ground colour with six irregular transverse dark greyish-brown lines. The basal four of these are broken up into spots and streaks, while the marginal line is broken up into small inter-neural lunules.

Length of fore wing: 18 mm.

Holotype male. UGANDA: Bwamba, September, 1942 (*T. H. E. Jackson*) (in British Museum (N.H.)).

There remain the descriptions of the males of three species known hitherto only in the female: *Epitola carpenteri* B.-Baker, *Epitola virginea* B.-Baker and *Epitola cepheua* Hewitson.

Epitola carpenteri Bethune-Baker

(Pl. 22, figs. 37, 38)

MALE. The upper surface strongly resembles that of *viridana* Joicey & Talbot and *maculata* Hawker-Smith. Fore wing brownish-black with a longitudinal row of three blue spots posterior to the cell, and two blue spots in the cell. There are also two very small subapical blue spots. Hind wing brownish-black with a large discal blue area bounded anteriorly by vein 6, posteriorly by vein 1, and distally by a black border approximately 1 mm. wide. The under surface shows, on the fore wing, the usual dark longitudinal mark characteristic of the *pinodes* group of species. The ground colour is pale greyish-brown, heavily marked with whitish, especially the hind wing in which the whitish colour is dominant over the ground colour. The nature of the pattern is similar to that of the female.

Length of fore wing: 16 mm.

Allotype male. UGANDA: Bwamba, October, 1941 (*T. H. E. Jackson*) (in British Museum (N.H.))

This species is of great taxonomic importance in that it forms the link between the *pinodes* and *nitide* groups of species.

Epitola virginea Bethune-Baker

(Pl. 20, figs. 17, 18)

Male. The greater part of the disc of the fore wing above is occupied by a large circular scent patch. This is distinguishable by its curious matt appearance from the black apex and distal border of the wing. There is slight blue scaling at the extreme base of the wing and along the posterior margin. There are two blue spots, one at the tornus, and the other, smaller, one just anterior to it. The hind wing is blue with a fine black marginal line. The blue colour is bounded anteriorly by vein 6. The under surface is similar to that of the female.

Length of fore wing : 18 mm.

Allotype male. Sierra Leone : Daru, 14th August, 1951 (*E. P. Young*) (in British Museum (N.H.)).

Epitola cephena Hewitson

(Pl. 22, figs. 31, 32)

Male. Upper surface dark brownish-black without markings except for a small patch of rather indistinct blue scaling over the distal half of the cells of the hind wing. The under surface is dark grey with a darker longitudinal mark on the fore wing extending from the base of the wing, and covering the posterior half of the fore wing except for the middle third of areas 1 and 2 which are of the ground colour. The fore wing has a very indistinct marginal row of slightly lighter-coloured lunules. The hind wing has five rows of lighter lunules of which the marginal and submarginal rows are fairly distinct, the remainder being represented only by traces.

Length of fore wing : 18 mm.

Allotype male. S.E. Nigeria : Oji River, 2nd November, 1950 (*T. F. Davey*) (in British Museum (N.H.)).

This species is distinguished from *E. mercedes* Suffert by the blue scaling in the cell of the hind wing above, and by the complete absence of blue scales on the fore wing above.

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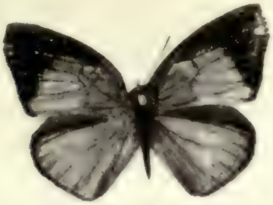
EXPLANATION OF PLATES.

PLATE 19

FIG. 1. *Epitola flavoantennata*, ♂ upperside.
FIG. 2. *Epitola flavoantennata*, ♂ underside.
FIG. 3. *Epitola flavoantennata*, ♀ upperside.
FIG. 4. *Epitola flavoantennata*, ♀ underside.
FIG. 5. *Epitola ikoya*, ♂ upperside.
FIG. 6. *Epitola ikoya*, ♂ underside.
FIG. 7. *Epitola ikoya*, ♀ upperside.
FIG. 8. *Epitola ikoya*, ♀ underside.
FIG. 9. *Epitola intermedia*, ♂ upperside.
FIG. 10. *Epitola intermedia*, ♂ underside.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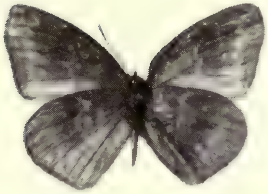
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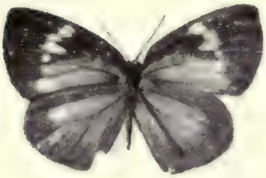
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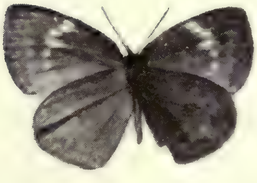
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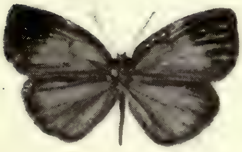
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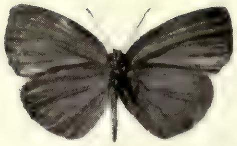
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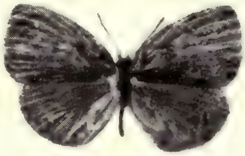
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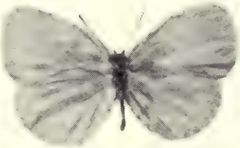
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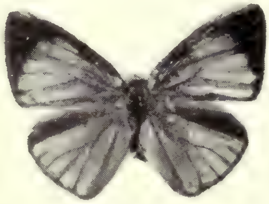
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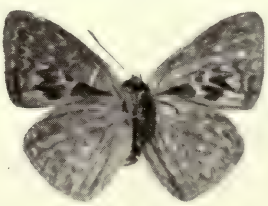
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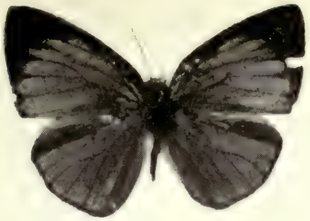
Epitola.

PLATE 20

Fig. 11. *Epitola convexa,* ♂ upperside.
Fig. 12. *Epitola convexa,* ♂ underside.
Fig. 13. *Epitola carilla,* ♂ upperside.
Fig. 14. *Epitola carilla,* ♂ underside.
Fig. 15. *Epitola jacksoni,* ♂ upperside.
Fig. 16. *Epitola jacksoni,* ♂ underside.
Fig. 17. *Epitola virginea B-B,* ♂ upperside.
Fig. 18. *Epitola virginea B-B,* ♂ underside.
Fig. 19. *Epitola daveyi,* ♂ upperside.
Fig. 20. *Epitola daveyi,* ♂ underside.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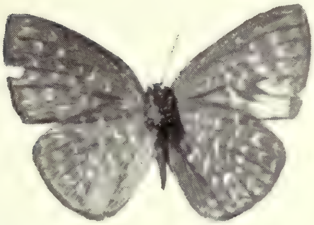
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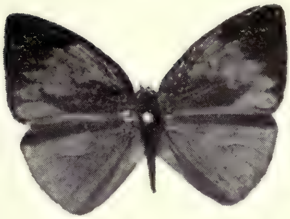
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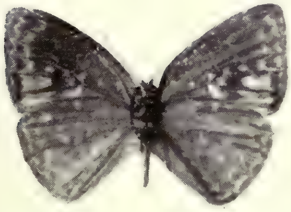
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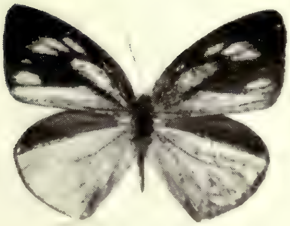
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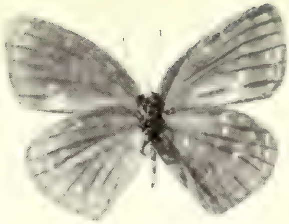
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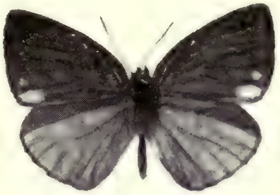
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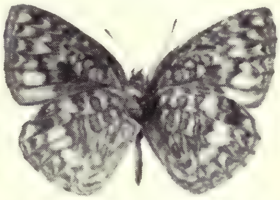
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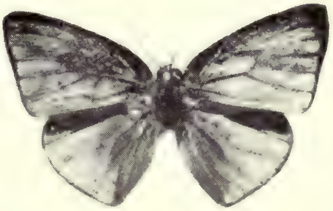
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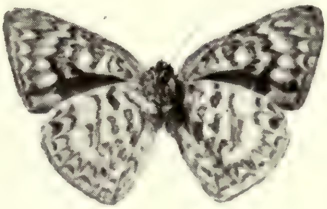
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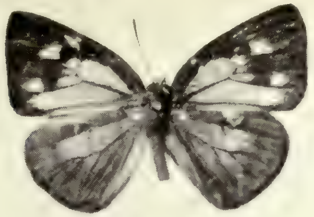
Epitola.

PLATE 21

Fig. 21. *Epitola daveyi*, ♀ upperside.
Fig. 22. *Epitola daveyi*, ♀ underside.
Fig. 23. *Epitola liana*, ♂ upperside.
Fig. 24. *Epitola liana*, ♂ underside.
Fig. 25. *Epitola subcoerulea*, ♂ upperside.
Fig. 26. *Epitola subcoerulea*, ♂ underside.
Fig. 27. *Epitola dolorosa*, ♂ upperside.
Fig. 28. *Epitola dolorosa*, ♂ underside.
Fig. 29. *Epitola dolorosa*, ♀ upperside.
Fig. 30. *Epitola dolorosa*, ♀ underside.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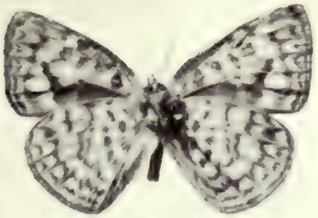
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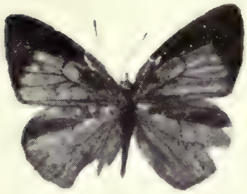
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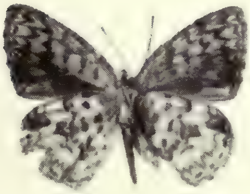
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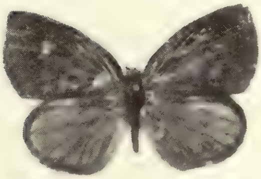
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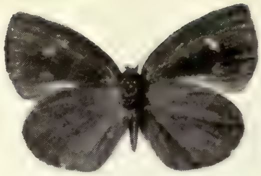
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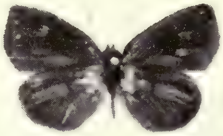
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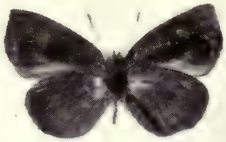
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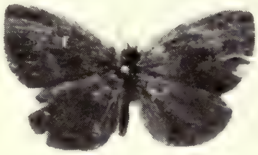
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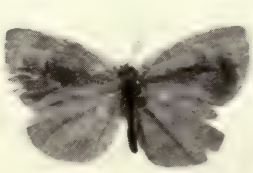
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Epitola.

PLATE 22

Fig. 31. *Epitola cephena* Hew., ♂ upperside.
Fig. 32. *Epitola cephena* Hew., ♂ underside.
Fig. 33. *Epitola ghesquierei*, ♂ upperside.
Fig. 34. *Epitola ghesquierei*, ♂ underside.
Fig. 35. *Epitola orientalis*, ♂ upperside.
Fig. 36. *Epitola orientalis*, ♂ underside.
Fig. 37. *Epitola carpenteri B-B*, ♂ upperside.
Fig. 38. *Epitola carpenteri B-B*, ♂ underside.

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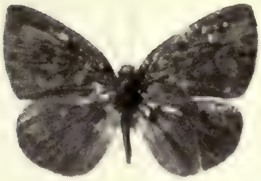

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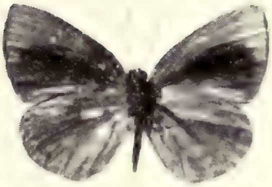

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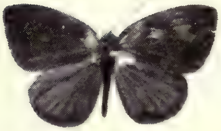

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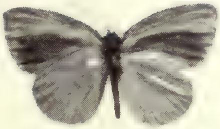

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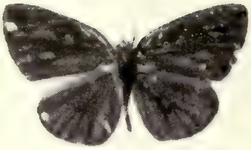

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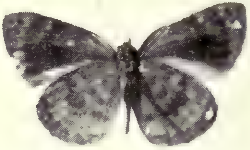

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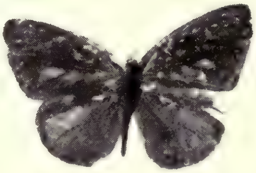

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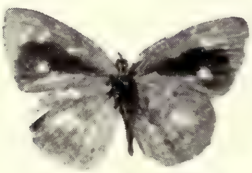

Epitola.

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AFRICAN SPECIES OF THE GENUS *PARDOMIMA* WARREN

(LEPIDOPTERA : PYRALIDAE : PYRAUSTINAE)

EDWARD L. MARTIN

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ENTOMOLOGY Vol. 3 No. 14
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Pp. 503–521 ; *Pl.* 23 ; 43 *Text-figures*

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THE AFRICAN SPECIES OF THE GENUS *PARDOMIMA* WARREN

(LEPIDOPTERA : PYRALIDAE : PYRAUSTINAE)

By EDWARD L. MARTIN,

SYNOPSIS

Twelve African species of *Pardomima* are here described, included in two subgenera ; six of the species and one subgenus are described as new.

HITHERTO a number of African Pyraustinae have been confused under the omnibus name "*Lygropia amyntusalis* Walker," a species confined to the Indo-Malayan region. With others described in various genera, such as *Lamprosema*, *Sylepta* and *Entephria*, these species form a compact group, here brought together under the genus *Pardomima* Warren, of which *P. amyntusalis* is the type species. Various authors have previously drawn attention to the remarkable " mimicry " existing between the species ; this undoubtedly close resemblance is perhaps less remarkable between congeneric species with the same basic pattern of markings.

For the purposes of the present paper, about six hundred specimens have been examined and about sixty preparations of genitalia made. My thanks are due to Professor E. M. Hering for the loan of the type of *P. distortana* Strand, and several other specimens from the Zoologisches Museum der Humboldt-Universität, Berlin ; to Dr. Elli Franz of the Senckenbergische Naturforschende Gesellschaft, Frankfurt-am-Main, for the loan of type material of *P. testudinalis* Saalmüller ; to Monsieur L. A. Berger for the loan of *P. phalarota* Meyrick, *P. phalaromima* Meyrick, *P. empalacta* Meyrick, and a large number of other specimens from the Musée du Congo Belge, Tervuren ; to Monsieur P. Viette for the loan of specimens from the Muséum National d'Histoire Naturelle, Paris ; to Mr. Elliot Pinhey for the loan of specimens from the Coryndon Museum, Nairobi ; and especially to Monsieur E. Janmoulle, who has been most helpful in searching for material in the Musée du Congo Belge and has made helpful suggestions.

PARDOMIMA Warren

Pardomima Warren, 1890. *Ann. Mag. nat. Hist.* (6) **6** : 477.

Type species : *Botys amyntusalis* Walker (original designation).

Frons bluntly rounded, not prominent, with ochreous-yellow to orange-yellow scales. Vertex with yellowish or fuscous scales. Labial palpus upcurved, first segment half of second, third two-fifths length of second, apex blunt (half length of second, slender, pointed, in *phalaromima*), third segment and oblique upper half of second fuscous-scaled. Maxillary palpus small, slender, pointed, ascending, tip usually with fuscous scales. Proboscis well-developed, with light-coloured scales at base (fuscous in *phaeoparda* and in some specimens of *phalaromima*). Antenna minutely ciliate, segments of distal two-thirds with two slender spines, equal in length to that of the segment bearing them, medial segments with additional smaller spines. Ocelli present. Thorax and tegulae with a variable number of fuscous spots, sometimes enlarged so as to eliminate lighter markings. Legs whitish or yellowish ; fore-tibia with a fuscous band, slightly dilated, bearing a ventral pointed flap concealed by scaling ; tibial spurs 0, 2, 4 ; in subgenus *Pachyparda* mid-femur of male enlarged, containing a cavity filled with hairs. Abdomen similar in colour to the ground colour of the wings, often tinged with orange or suffused with fuscous ; typically with two fuscous spots on first tergum, three triangular spots on second tergum, sometimes confluent, darker scaling on seventh tergum, and eighth segment of male fuscous with a conspicuous white or ochreous yellow lateral streak ; posterior margin of terga often bordered with shining-white scales.

Fore wing with costa straight, convex before apex ; termen oblique, especially in male, usually convex above tornus. R_3 and R_4 stalked for about half their length, R_4 to apex, R_5 approximated to R_{3+4} near base, Cu_{1b} from five-sixths, A_3 curved to form anal loop. Hind wing subtriangular ; frenulum fused (simple) in the male, composed of two spines in the female ; Sc and Rs anastomosing for a short distance beyond cell, Rs weak near base, Cu_2 weak, A_3 to tornus.

Type of markings : Ground colour whitish-yellow to yellowish-orange, markings light or dark fuscous. Fore-wing often with a yellowish-orange costal streak ; two basal dots on costa, a similar dot on dorsum, which, with the outermost costal dot, may fuse to form a basal line ; antemedial line at one-quarter, curved, centre of arc at base of wing ; a discal dot immediately distad of antemedial line and sometimes joined to it ; discal blotch hollow, somewhat 8-shaped ; postmedial line sharply angulate, from dorsum parallel with termen to lower margin of discal blotch (first segment), whence it proceeds to above tornus (second segment), where it is again directed parallel with termen to M_2 (third segment), stepped slightly basad at M_2 reaching costa at three-quarters (fourth segment) ; a thin terminal line from apex to tornus, expanded above tornus to meet second angle of postmedial line, expanded below apex towards, or reaching, post-medial line between M_1 and M_2. Hindwing with antemedial line almost straight, from below costa at one-third to dorsum above tornus, furcate below costa ; postmedial line from below costa at two-thirds to M_2, where it is stepped slightly distad, reaching termen above tornus, where it is expanded on reaching terminal line forming a tornal patch ; terminal line expanded from apex to M_2 where it may extend to postmedial line.

♂ genitalia : Uncus slender, dilated and spinose at apex ; gnathos absent ; juxta spatulate ; tegumen slightly curved at base, not produced ; valva somewhat variable in shape, tapering towards apex, typically with a basal, apical and costal tuft of short hairs, and a row of submarginal spines near apex, inner surface sometimes with a medial projection above the inner margin, costa of valva strong, often twisted, at a distance from the costal margin, costae connected by brassière-shaped transtillae ; sacculus with a short inner projection. Aedoeagus usually with a variable number of cornuti, which are often thorn-shaped ; coremata often well-developed, typically composed of an inner pair of tufts with simple scales and an outer pair of larger tufts often containing compound scales (composed of a large number of simple scales fused for the whole, or greater part, of their length.

♀ genitalia : Ductus bursae variously sclerotized, often with protuberances ; bursa copulatrix typically with a crescentic denticulate signum.

BIOLOGY.—Virtually unknown ; the only record available refers to the larva of "*Lygropia amyntusalis*" feeding on the leaves of coffee (Hargreaves, 1928, Ann. Rep. Dept. Agric. Uganda 1927 : 34). The record may refer to *P. zanclophora*, but at present the point cannot be decided.

DISTRIBUTION.—Ethiopian region (including Madagascar), Indo-Malayan and Australasian regions.

The species can be easily distinguished superficially from all other Pyraustinae by the pattern of markings alone. In order to avoid repetition, the basic pattern of the markings has been given in the generic description, and diagnostic features only are given in the specific descriptions. Owing to the similarity in markings and the great variation in many of the species a key to species based on superficial characters is not given ; most specimens may however be easily recognized from the photographic illustrations. In case of doubt recourse should be had to the genitalia, the chief diagnostic features of which are given for each species.

The genus is not closely related to *Syllepte* (type species : *S. incomptalis* Hübner) or *Lygropia* (type species : *Asopia unicoloralis* Guenée), with which many of its species have been associated. Both these genera possess a broad uncus in the male, tapering towards an apex which does not bear close-set spines. As suggested by Warren, the genus is allied to *Arthromastix* Warren (type species : *Salbia lauralis* Walker) and *Nothomastix* Warren (type species : *Botys chromalis* Walker) from which it may be distinguished by the non-specialized antennae of the male and the different pattern of wing-markings. The genus *Pardomima* is readily divisible into two subgenera, the characters of which are given under those headings.

KEY TO SPECIES BASED ON THE MALE GENITALIA

1.	Costal margin of valva with protuberance(s) . . . (subgen. *Pachyparda*)	10.
	Costal margin of valva without protuberances . . . (subgen. *Pardomima*)	2.
2.	Coremata with conspicuous, dark, compound, scales	3.
	Coremata without such scales	6.
3.	Inner surface of valva with slender projection	4.
	Inner surface of valva without projection	5.
4.	Costal margin of valva strongly arched near base	*phaeoparda*.
	Costal margin of valva not so arched	*telanepsia*.
5.	Aedoeagus with sickle-shaped cornutus	*zanclophora*.
	Aedoeagus with an apical bunch of slender cornuti	*azancla*.
6.	Apex of valva more or less pointed	7.
	Apex of valva bluntly rounded	9.
7.	Aedoeagus with a single bunch of cornuti situated apically	*furcirenalis*.
	Aedoeagus with cornuti not so situated	8.
8.	Inner surface of valva with angular projections	*testudinalis*.
	Inner surface of valva without projections	*callixantha*.
9.	Aedoeagus with two cornuti	*phalarota*.
	Aedoeagus without distinct cornutus	*phalaromima*

10. Costal margin of valva with two slender projections near apex . . . *distortana*.
    Costal margin of valva without such projections . . . . 11.
11. Costal margin of valva with large rounded protuberance at two-thirds . . *tumidipes*.
    Costal margin of valva without such protuberance . . . . . *margarodes*.

Subgenus ***Pardomima*** Warren

Mid-femur of male not enlarged, without cavity ; valva of male with costal margin smoothly rounded, without protuberances ; coremata with or without compound scales ; bursa copulatrix of female almost always with a crescent-shaped signum. Typical markings of abdomen well-developed, pale lateral streak on eighth segment of male conspicuous.

Pardomima (Pardomima) furcirenalis (Hampson)

(Text-figs. 1, 2, 23 ; Plate 23, fig. 1)

Lamprosema furcirenalis Hampson, 1918. *Ann. Mag. nat. Hist.* (9) **1** : 257.
Lamprosema furcirenalis Hampson, Klima, 1939. *Lepidopterorum Catalogus* **89** : 168.

Characterized by the restricted distribution and diffuse nature of the secondary markings.

♂, ♀ 17–18 mm., secondary markings not prominent, merging into ground colour. Forewing without basal line ; antemedial line furcate below costa, distal branch representing the obliquely-placed discal dot ; discal blotch open towards dorsum, not connected with postmedial line ; antemedial and postmedial lines slightly convergent towards dorsum, not connected along dorsum by fuscous markings ; postmedial line with second segment obsolescent, second angle connected to tornus by a pale yellowish-fuscous suffusion ; terminal line slightly enlarged on veins, enlarged towards costa forming a pale yellowish-fuscous suffusion reaching postmedial line between M_1 and M_2. Hindwings with tornal suffusion indistinct, sometimes extending slightly towards antemedial line ; terminal line and suffusion as in forewings.

♂ genitalia : Valva bluntly pointed ; aedoeagus with an apical group of small cornuti, rather similar to *amyntusalis* ; coremata reduced to a few slender scales.

♀ genitalia : Ductus bursae slightly enlarged and sclerotized near ostium bursae ; signum absent.

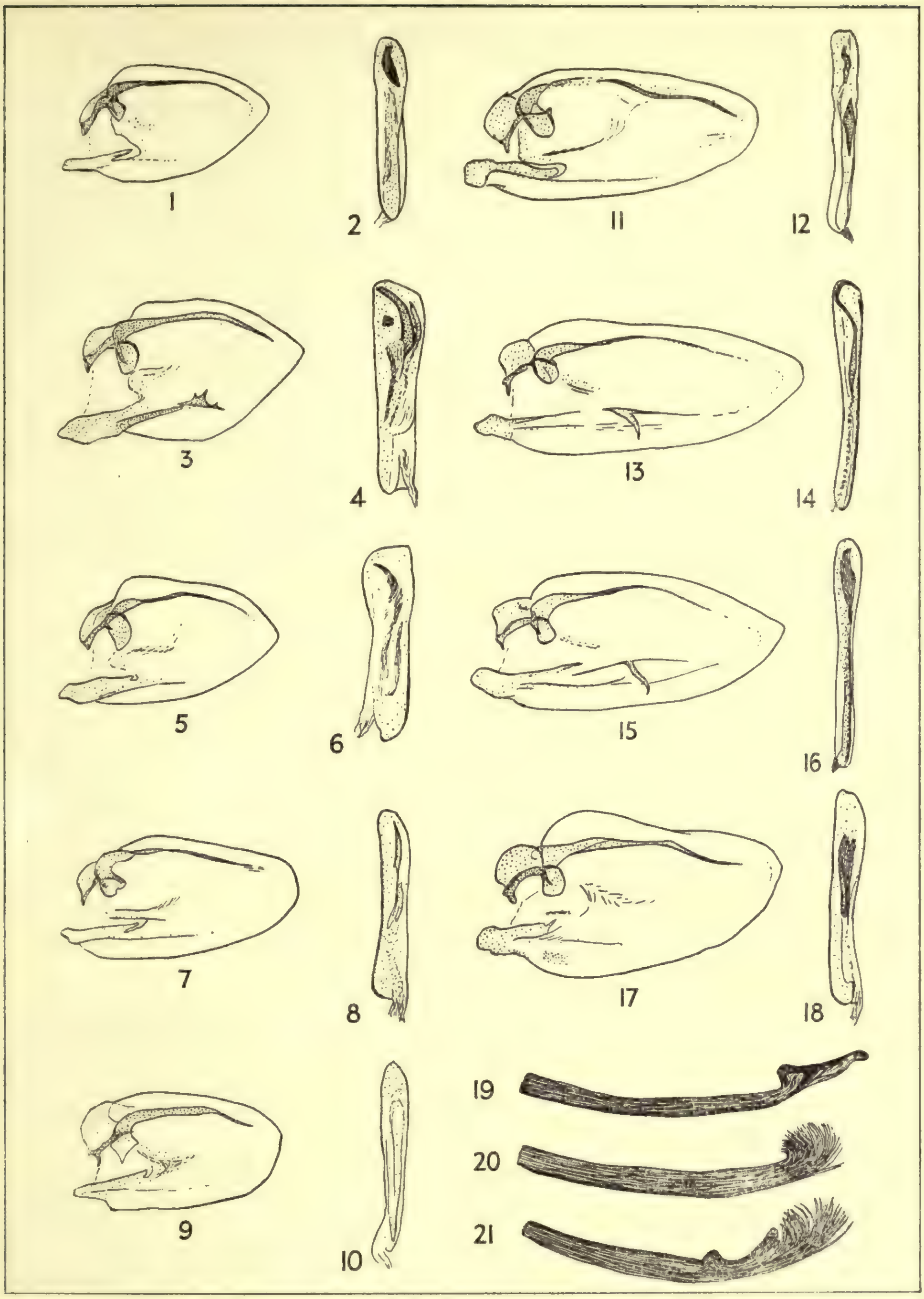
DISTRIBUTION. Union of S. Africa, Natal and Cape Province.

MATERIAL EXAMINED. BRITISH MUSEUM (NATURAL HISTORY) : *Holotype* ♀, Bedford, S. Africa, Weale ; 3♀, Verulam, Natal, Spiller ; 2 ♂, 1 ♀, Natal, A. J. Spiller ; 1♀, Natal, Bond's Drift, Tugela R., iii–iv, 1902, E. Reynolds ; 1♀, Transkei, Cape Colony, Miss Barrett.

Pardomima (Pardomima) testudinalis (Saalmüller)

(Text-figs. 3, 4, 22 ; Plate 23, fig. 2)

Glyphodes ? testudinalis Saalmüller, 1880. *Ber. senckenb. naturf. Ges.* **1879–1880** : 297.
Glyphodes ? testudinalis Saalmüller, Saalmüller 1884. *Lepidopteren von Madagascar* : 506.
Lygropia amyntusalis Walker, Hampson 1899. *Proc. zool. Soc. Lond.* **1898** : 728 (partim).
Lygropia amyntusalis Walker, Klima 1939. *Lepidopterorum Catalogus* **94** : 22 (partim).



FIGS. 1–21. *Pardomima* (*Pardomima*): Male genitalia. 1. *P. furcirenalis* Hampson, valva. 2. *P. furcirenalis* Hampson, aedoeagus. 3. *P. testudinalis* Saalmüller, valva. 4. *P. testudinalis* Saalmüller, aedoeagus. 5. *P. callixantha* sp. n., valva. 6. *P. callixantha* sp. n., aedoeagus. 7. *P. phalarota* Meyrick, valva. 8. *P. phalarota* Meyrick, aedoeagus. 9. *P. phalaromima* Meyrick, valva. 10. *P. phalaromima* Meyrick, aedoeagus. 11. *P. telanepsia* sp. n., valva. 12. *P. telanepsia* sp. n., aedoeagus. 13. *P. zanclophora* sp. n., valva. 14. *P. zanclophora* sp. n., aedoeagus. 15. *P. azancla* sp. n., valva. 16. *P. azancla* sp. n., aedoeagus. 17. *P. phaeoparda* sp. n., valva. 18. *P. phaeoparda* sp. n., aedoeagus. 19. *P. telanepsia* sp. n., coremata scale. 20. *P. zanclophora* sp. n., coremata scale. 21. *P. phaeoparda* sp.n., coremata scale. All figures × 15.

Very closely allied to *callixantha,* from which it is readily distinguished by the broad antemedial line of the hindwings.

♂, ♀ 22–24 mm. Forewing with basal dots separate ; antemedial line evenly curved ; discal dot separate, or attached to antemedial line ; first segment of postmedial line broad, forming, with the discal blotch, a distinct medial fascia, connected to antemedial line by a fuscous suffusion on dorsum, remainder of line more slender ; terminal line expanded towards costa, extending towards, but not reaching, postmedial line between M_1 and M_2. Hindwings with antemedial line very broad, more than twice width of third segment of postmedial line of forewings ; postmedial line obsolescent towards tornus ; terminal line expanded slightly from tornus to divergence of postmedial line, expanded at apex to form a sub-triangular patch.

♂ genitalia : Uncus with a shallow V-shaped cleft at apex ; valva bluntly pointed, inner surface armed with two triangular sclerotized projections, from the larger of which arises a similar projection ; coremata of slender scales of uniform size.

♀ genitalia : Ductus bursae sclerotized towards ostium bursae, bearing a rounded flap-like projection and an angular shoulder, from which point it is constricted to the ostium ; signum very slightly curved.

DISTRIBUTION. Recorded only from N.W. Madagascar.

MATERIAL EXAMINED. BRITISH MUSEUM (NATURAL HISTORY) : 1♂, Diego Suarez, 23 April 1917, G. Melou ; 1♀, Diego Suarez, March 1917, G. Melou. SENCKENBERGISCHE NATURFORSCHENDE GESELLSCHAFT (SAALMÜLLER COLLECTION) : 2♂, 1♀ *syntypes*, Nossi-Bé, one male bearing a label inscribed 66 ; 1♀, Loucoubé, Ebenau, 80.

TYPE MATERIAL. The label " 66 ", carried by one of the syntypes gives the species number of the original description ; this specimen is here designated the *lectotype*, the two other specimens becoming paralectotypes. All specimens are in the collection of the Senckenbergische Naturforschende Gesellschaft, Frankfurt-am-Main.

Pardomima (Pardomima) callixantha sp. n.

(Text-figs. 5, 6, 24 ; Plate 23, fig 3)

Lygropia amyntusalis Walker, Klima, 1939. *Lepidopterorum Catalogus* **94** : 227 (partim).
Lygropia amyntusalis Walker, Ghesquière, 1942. *Ann. Mus. Congo belge* C (3[2]) **7** (2) : 139–140 (partim).

Very closely allied to the preceding species, from which it is readily distinguished by the much narrower antemedial line of the hindwings.

♂ 22–24 mm., ♀ 20–22 mm. Differs from *testudinalis* as follows : Width of antemedial line of hindwings below furcation not exceeding width of third segment of postmedial line of forewings ; terminal suffusion of forewings almost always reaching postmedial line between M_1 and M_2 ; tornal patch of hindwings, when present, triangular.

♂ genitalia : Valva with length slightly exceeding breadth, bluntly pointed, inner surface without projections ; aedoeagus broad, with three groups of stout cornuti : coremata as in *testudinalis*.

♀ genitalia : Very similar to *testudinalis* ; ductus bursae without rounded flap-like projection.

Distribution. Gold Coast ; Nigeria ; French West Africa ; French Equatorial Africa ; Belgian Congo ; Angola ; Northern and Southern Rhodesia ; Transvaal ; Cape Province ; Natal ; Nyasaland ; Kenya, and Ethiopia.

Material examined. British Museum (Natural History) : *Holotype* ♂, Mpeta, Loangwa R., affl. of Zambesi, xi, xii. 1895, B. of rainy s., Coryndon ; *Allotype* ♀, Mashonaland, Salisbury, Feb. 1904, G. A. K. Marshall ; 2♀ paratypes, Mashonaland, Salisbury, 20. iii. 1898, April 1901, G. A. K. Marshall ; 1♂, N. Rhodesia, Fort Jameson, Phipps ; 2♂, 1♀, Weenen, Natal ; 3♂, 1♀, Natal, Spiller ; 1♂, 1♀, Verulam, Natal, Spiller ; 1♀, Pinetown, Natal, i. 1909 ; 1♂, Transvaal, Waterberg Dist., 1. iii. 1899, Zutizencka ; 1♀, Pretoria, 13. xi. 1906, A. J. T. Janse ; 1♂, Port St. Johns, W. Pondoland, 1915, H. H. Swinney ; 2♂, Nyasaland, Mt. Mlanje, 16. v., 27. x. 1913, S. A. Neave ; 1♀, Kedai, Kenya, 9 Jan. 1912, Feather ; 2♀, Kibwesi, B.E.A., 23 April, 1922 ; 1♂ Marago ya Fundi, 4. iii. 1891, C. S. Betton ; 2♂, Tambura, Southern Bahr-el-Ghazal ; 1♂, Abyssinia, Dulla, Kaffa, 5,000 ft., 13. vi. 1905, Ph. C. Zaphiro ; 2♂, Elisabethville, Belgian Congo, 12. i. 1933, C. S. ; 1♂, Talala, Benguella, 1 Dec. 1905, Dr. Ansorge ; 1♂, Warringo R., Unyoro, 11. xii. 1897, Dr. Ansorge ; 1♀, Gamba, Bihé, Angola, Dec. 1934, R. Braun ; 1♀, Lagos, W. Africa ; 1♀, Nsuaem, Gold C., Jan. 1922, N. E. Bell ; 1♂, Ivory Coast, Beoumi, xii. 1922–i. 1923, W. P. Lowe & H. R. Hardy. Muséum National d'Histoire Naturelle, Paris : 1♂ *paratype*, Angola, entre Capelongo et Dougo, 27. xii. 1912 ; 1♂, Soudan français, Bamako. Musée du Congo Belge, Tervuren : 1♂, 1♀ *paratype*, Elisabethville, 22. ix. 1950, xi. 1948, Ch. Seydel ; 6♂, 1♀, Elisabethville, 26. iv. 1933, 26. iii. 1936, 4. xii. 1936, i. 1938, 21. ii. 1948, xii. 1948, xi. 1949, Ch. Seydel ; 1♂, Lubumbashi, 31. iv. 1934, Ch. Seydel. Coryndon Museum, Nairobi : 1♂ *paratype*, Chiwefwe, N. Rhodesia, Feb. 1950, N. Mitton ; 1♂, Broken Hill, N. Rhodesia, Feb. 1950, N. Mitton ; 1♀, North Kibwesi, Kenya, 3,000 ft., Jan. 1950, J. G. Williams ; 1♀, Isiolo, K. C., Apr.–May 1951, Mrs. Adamson.

Pardomima (Pardomima) phalarota (Meyrick)

(Text-figs. 7, 8, 25 ; Plate 23, figs. 6, 7)

Lygropia phalarota Meyrick, 1933. *Exotic Microlepidoptera* **4** : 404–405.
Lygropia phalarota Meyrick, Klima, 1939. *Lepidopterorum Catalogus* **94** : 229.
Dichocrocis phalarota Meyrick, Ghesquière, 1942. *Ann. Mus. Congo belge* C. (3[2]) **7** (2) : 140–141 (partim).

A very variable species ; more lightly marked specimens resemble *callixantha*, from which they may be distinguished by the absence of chequered cilia ; darker specimens resemble *phalaromima* but the third joint of the labial palpi is much shorter. In the original description the month should read " February ", not " November".

♂, ♀ 19–23 mm., development of secondary markings variable. Forewing with basal dots separate, or forming a basal line ; antemedial line somewhat broader towards costa ; discal dot variable in size, not connected to antemedial line, sometimes connected along cubitus to lower edge of discal blotch ; in some specimens (including the type) the areas of ground colour distad of the postmedial line are reduced to two small patches, one beneath the first angle, the other distal to the fourth segment of the postmedial line ; where distinct, fuscous marking connecting terminal and postmedial lines between M_1 and M_2 wedge-shaped, apex towards base of wing. Terminal markings of hindwing variable, usually connected to postmedial line between M_1 and M_2 ; postmedial line expanded above tornus, tornal patch sometimes extending somewhat towards antemedial line.

♂ genitalia : Valva with apex rounded ; aedoeagus with two cornuti, one pointed ; coremata of slender scales.

♀ genitalia : Ductus bursae with two sclerotized protuberances ; signum crescent-shaped, somewhat angled centrally.

DISTRIBUTION. Angola, Belgian Congo, Northern and Southern Rhodesia, Nyasaland, Mozambique.

MATERIAL EXAMINED. BRITISH MUSEUM (NATURAL HISTORY) : 1♂ *paratype*, N. Kivu, Belgian Congo, C.S., ii.1928 ; 1♂, Port St. Johns, W. Pondoland, 1915, H. H. Swinney ; 1♂, Chirinda Forest, Gazaland, 9.xii.1901, G. A. K. Marshall ; 3♀, Mashonaland, Salisbury, Mar., Apr., Dec., 1904, G. A. K. Marshall ; 1♂, Durban, iv.1906, A. T. Cooke ; 4♂, 3♀, Nyasaland, Mt. Mlanje, 7.iii, 7.v, 4, 17.xi.1913, 19.i, 5.ii.1914, S. A. Neave ; 1♀, Port E. Africa, E. of Mt. Chiperone, 2,200 ft., 23.xi.1913, S. A. Neave ; 1♂, Kitale, Kenya, 23.iv.1925, G. W. Jeffery ; 2♂, Elisabethville, Belgian Congo, C. S. 16.iii.1934, 27.ii.1935 ; 1♂, Angola, Mt. Moco, Luimbale, 1800–1900 m., 18 March 1934, Dr. K. Jordan. MUSÉE DU CONGO BELGE, TERVUREN : *Holotype* ♂, 1♂ *paratype*, N. Kivu, Kissenyi, ii.1928, Ch. Seydel ; 1♂, 2♀, Eala, 18.vi, viii, ix.1935, J. Ghesquière ; 1♀, Elisabethville, xii.1912, Ternest ; 1♂, Elisabethville, 30.xi.1938, à la lumière, H. J. Bredo ; 20♂, 6♀, Elisabethville, 23.iii.1930, 3.v, 16.vi.1933, 29.iii.1934, 5.i, 27.ii, 19.xii.1935, i, 26.ii, 18.iii, 15.ix, 14.xi, xii.1936, i, 15.iii, 2, 27.xi, xii.1937, xii.1948, 22.i, ii, 19.xii.1949, 11, 14.iii.1950, Ch. Seydel. ZOOLOGISCHES MUSEUM, BERLIN : 1♂, Verulam, Natal, Spiller, 1♀, Bagamoyo, v.93. CORYNDON MUSEUM, NAIROBI : 2♂, Sinoia, S. Rhodesia, 21.ii.1950, N. Mitton ; 1♂, 1♀, Broken Hill, N. Rhodesia, Feb. 1950, N. Mitton.

Pardomima (Pardomima) phalaromima (Meyrick)

(Text-figs. 9, 10, 26 ; Plate 23, figs. 8–10, 20)

Entephria phalaromima Meyrick, 1933. *Exotic Microlepidoptera* **4** : 401–402.
Pycnarmon phalaromima Meyrick, Klima 1939. *Lepidopterorum Catalogus* **89** : 26.
Lygropia amyntusalis Walker, Klima 1939. *Lepidopterorum Catalogus* **94** : 227 (partim).
Pycnarmon phalaromima Meyrick, Ghesquière 1940. *Ann. Mus. Congo belge* C. (3[2]) **7** (1) : 114.
Pycnarmon tabidialis Snellen, Ghesquière 1940. *Ann. Mus. Congo belge* C. (3[2]) **7** (1) : 115.

Easily separated from all the other African species of the genus by the slender, pointed third segment of the labial palpi. The almost straight inner edge of the terminal fuscous markings is characteristic in the majority of specimens. The locality given in the original description should read " Luebo ", not " Luelio".

♂, ♀ 18–26 mm. Third segment of labial palpus half length of second, slender, pointed ; posterior margins of abdominal tergites often bordered with fuscous scales. Basal dots of forewing forming a basal line ; antemedial line frequently expanded on cubitus; discal dot curved, bar-shaped, connected to lower part of discal blotch along cubitus, thus enclosing a circular patch of ground colour; third segment of postmedial line broad, inner margin continuous towards apex with inner margin of apical patch; tornal patch of ground colour reduced to a small subquadrate area, or absent. Tornal patch of hindwing large, projecting towards antemedial line, costal margin following Cu_{1a}; apical patch large, angled to meet postmedial line. In extreme forms the entire dorsal and terminal areas of both wings may be fuscous.

♂ genitalia: Valva with apex rounded; aedoeagus without sclerotized cornutus; scales of coremata slender, some with tips expanded, recurved.

♀ genitalia: Ductus bursae sclerotized for one-third of its length adjacent to ostium bursae; signum crescent-shaped, denticulate.

DISTRIBUTION. Sierra Leone, French Guinea, Ivory Coast, Nigeria, Cameroons, Fernando Po, Angola, Belgian Congo, Nyasaland, Kenya, Tanganyika.

MATERIAL EXAMINED. BRITISH MUSEUM (NATURAL HISTORY): 2♀, West Africa, Sierra Leone, A. B. Frere; 8♂ 7♀ Bingerville, Ivory Coast, Nov. 1913, May 25–June 3, July 1–14, 28–31, Aug. 1–5, 5–7, 14–18, 25–30, Sept. 8–11, 1915, G. Melou; 1♀, Lagos, H. Strachan; 1♂, 1♀, R. Niger, Sapele, F. W. Sampson; 1♀, Old Calabar, F. W. Sampson; 1♀, S. Nigeria, Ilesha, L. E. H. Humphrey; 1♀, Degama, Niger, Dr. Ansorge; 10♂, 10♀, Warri, iv, v, vi, vii, viii, ix, 1897; 1♂, Fernando Po, Rev. J. Nicholls; 1♂, Pundo Andongo, Angola, Dondo, 24.ii.1875, A. v. Homeyer; 1♂, Johann-Albrechts Höhe Station-Kamerun, L. Conradt, 1896; 1, Congo R., 16 Sept. 1922, Congo Belge; 2♂, 2♀, Nyasaland, Mt. Mlanje, 18.iii, 24.iv, 11.vi.1913, 6.ii.1914, S. A. Neave; 1♀, Kenya, Meru Dist., Mt. Kenya, Sept. 1930, Mrs. H. Young. MUSÉUM D'HISTOIRE NATURELLE, PARIS: 1♀, Brazzaville; 1♀, Bingerville, Côte d'Ivoire; 1♀, Afr. Or. allm. Kilimandjaro, 800 m., Neu Moschi, iv.1912; 2♂, Nimba, Guinée, vii–xii.1951. MUSÉE ROYAL D'HISTOIRE NATURELLE, BRUSSELS: 1♂, P.N.A., Lac Magera, 2000 m., 26.ii–7.iii.1934, G. F. de Witte. MUSÉE DU CONGO BELGE, TERVUREN: *Holotype* ♂, Luebo, iv.1931, C. J. Colin; 4♂, 1♀, Eala, vi, ix, x, xi.1936, J. Ghesquière; 1♂, Kinchassa, Nov. 1896, Waelbroek; 1♂, Kinsala, Tombolo, x.1921, L. Verlaine; 1♂, Yangambi, x.1939, Henrard; 1♂, Kafakumba, iv.1929, G. F. Overlaet; 1♂, Sankuru, Dimbelenge, 11.ix.1951, Dr. M. Fontaine; 1♂, Equateur, Bamania, 1936, R. P. Hulstaert; 1♂, Buja, 4.vi.1912, Dr. Christy; 1♂, Lisala, 8.ii.1906, Waelbroek. ZOOLOGISCHES MUSEUM, BERLIN: 1♂, Kamerun, Mokundange, 1–15.viii.1905, G. Tessmann; 1♀, Kamerun, Jaunde-Stat., 800 m., Zenker.

Pardomima (Pardomima) telanepsia sp. n.

(Text-figs. 11, 12, 19, 29; Plate 23, figs. 4, 5)

Differs from *phalaromima* in the much shorter third segment of the labial palpi and the configuration of the terminal markings of the wings. Separated from *distortana* in the male by the possession of a pale lateral streak on the eighth segment, and non-specialized mid-femora, in the female by the restriction of the ground colour area below the cubitus of the forewings to one-half the distance between the antemedial and postmedial lines.

♂, ♀ 18–24 mm. Thorax and abdomen ochreous-grey, markings fuscous. Wing markings similar to *phalaromima*, but patches of ground colour of forewing distad of third and fourth segments of postmedial line wedge-shaped, narrow, apices towards each other, corresponding markings of hindwing similar.

♂ genitalia : Length of valva twice breadth, apex rounded ; aedoeagus with two cornuti, one diamond-shaped ; coremata with both simple and compound, light and dark, scales, some of the light scales clubbed at the tip, or at intervals along the length of the scale, compound fuscous scale not divided at tip.

♀ genitalia : Ductus bursae sclerotized from ostium bursae for one-half of its length, where there is a rounded sclerotized protuberance, sclerotization continued for a short distance along ductus seminalis ; sigma crescent-shaped, exceeding half the circumference of a circle.

DISTRIBUTION. Ivory Coast, Gold Coast, Nigeria, Fernando Po, French Equatorial Africa.

MATERIAL EXAMINED. BRITISH MUSEUM (NATURAL HISTORY) : *Holotype* ♂, Fernando Po, W. Cooper ; allotype ♀, Bingerville, Ivory Coast, 1915, G. Melou ; 4♂ paratypes, Fernando Po, Moka, 28.i–3.ii.1933, W. H. T. Tams ; Sapele, R. Niger, F. W. Sampson ; Kamerun, Lolodorf, 24.ii.1895, L. Conradt ; 1♂, 2♀, Warri, vii, viii, ix.1895, Dr. Roth ; 1♂, Gold Coast, N. Territories, Kete-Krachi, A. W. Cardinall. MUSÉUM NATIONAL D'HISTOIRE NATURELLE, PARIS : 1♂, Oubangui-Chari, Tchad, Bangui.

Pardomima (Pardomima) zanclophora sp. n.

(Text-figs. 13, 14, 20, 27 ; Plate 23, figs. 11–13)

Lygropia amyntusalis Walker, Klima, 1939. *Lepidopterorum Catalogus* **94** : 227 (partim).
Dichocrocis phalarota Meyrick, Ghesquière, 1942. *Ann. Mus. Congo belge* C. (3[2]) **7**(2): 140–141 (partim).

Very closely allied to *azancla*, but lacks the distinct projection of tornal patch towards antemedial line of the hindwings of that species. The hooked cornutus of the male aedoeagus separates it from all other African species. The irregular outline of the protuberance of the ductus bursae of the female separates it from *azancla*.

♂, ♀ 21–27 mm. Head, thorax and first two abdominal segments typically ochreous-yellow, remaining abdominal segments tinged with orange, markings fuscous, distinct ; posterior margins of abdominal terga 3–6 bordered with shining scales. Basal dots of forewing usually confluent ; discal dot usually separate from antemedial line ; a projection from the lower part of discal blotch may extend along cubitus towards, but not reaching, the discal dot ; dorsum between antemedial and postmedial lines almost always suffused fuscous ; second and third segments of postmedial line broad, prominent ; apical and tornal patches large, variable in extent. Hindwing with apical blotch not reaching postmedial line, tornal patch not extending towards antemedial line, except in a very few examples where it is diffuse.

♂ genitalia : Length of valva more than twice breadth, apex somewhat pointed, a slender, pointed projection from inner surface ; aedoeagus with a single hooked or sickle-shaped cornutus ; coremata with both simple and compound fuscous scales, tips of some of the simple scales clubbed.

♀ genitalia : Ductus bursae sclerotized adjacent to ostium bursae, expanded to form a protuberance of irregular outline ; signum crescentic, minutely denticulate.

Distribution. Belgian Congo, Mozambique, Tanganyika, Kenya, Grand Comoro, Madagascar, Ethiopia, S. W. Arabia.

Material examined. British Museum (Natural History) : *Holotype ♂, allotype ♀*, Suna, S. Kavirondo, January 1932, W. Feather ; 1♂, 1♀ *paratype*, Suna, S. Kavirondo, February 1932, W. Feather ; Kibwezi, B.E.A., Nov. 1920, W. Feather ; 2♀, Dar-es-Salaam, T. T., vi.1914, A. Loveridge ; 1♂, Kilwa, Germ. E. Africa, 11.ii.1900, Reimer ; 1♂, G. E. Africa, Usangu Distr., Ft. Kifulufulu Mtn., 3000 ft., 17.xii.1910, S. A. Neave ; 1♀, Delagoa Bay ; 1♀, Kenya Colony, Voi Plantations, 20.ii.1912, C. Montagu Smyth ; 1♂, Kenya, Kedai, 8.xii.191 , Fawcett ; 1♀, Grand Comoro, Sept., 1921, G. F. Leigh ; 2♀, Grande Comore, L. Humblot, 1884 ; 1♂, Sakaramy, N. E. Madagascar, 16 Feb. 1917, G. Melou ; 6♂, 4♀, Diego Suarez, Madagascar, 24.xii.1916, 5, 19, Feb., March-April, 1917, G. Melou ; 1♀, Arabia, Harabrab, 3.i.1937, H. St. J. B. Philby ; 1♂, Dire Daoua, Abyssinia, December 1934, H. Uhlenhuth ; 1♂, Diredaua, N. W. of Harar, 1914, G. Kristensen ; 1♀, Elisabethville, Belgian Congo, C. S. 11.x.34. Muséum National d'Histoire Naturelle, Paris : 1♂, 1♀ *paratype*, Afr. or. Allm., Kilimandjaro, Neu Moschi, 800 m. ; Bura, Afr. or. Angl., Wa-taïta, iii.1912, 1050 m. ; 1♂, 1♀, Bura, iii.1912, 1050 m. ; 1♂, Afr. orient, Lagoa Bay ; 1♂, Voï, Afr. or. Angl., mars 1911, 600 m. Musée du Congo Belge, Tervuren : 3♂, 1♀ *paratype*, Equateur, Bamania, 14.ix.1936, R. P. Hulstaert ; Elisabethville, 2.xi.1937, 4.ii.1938, Ch. Seydel ; Uvira, x.1927, Ch. Seydel ; 1♀, Rutschuru, v.1937, J. Ghesquière ; 1♀, Elisabethville, 6.x.1934, Ch. Seydel. Zoologisches Museum, Berlin : 1♀, D. O. Afrika, Mkalama, 3.ii.1905, v. d. Marwitz. Coryndon Museum, Nairobi : 1♂, 1♀ *paratype*, Iringa, Tanganyika, iii.1950, N. Mitton ; 1♂, 1♀, Mtito Andei, Kenya, iii.1950, N. Mitton.

Pardomima (Pardomima) azancla sp. n.

(Text-figs. 15, 16, 28 ; Plate 23, fig. 14)

Very closely allied to *zanclophora*, the formation of the tornal patch of the hindwings is constant in the specimens examined. The genitalic differences outlined below give a ready means of separation.

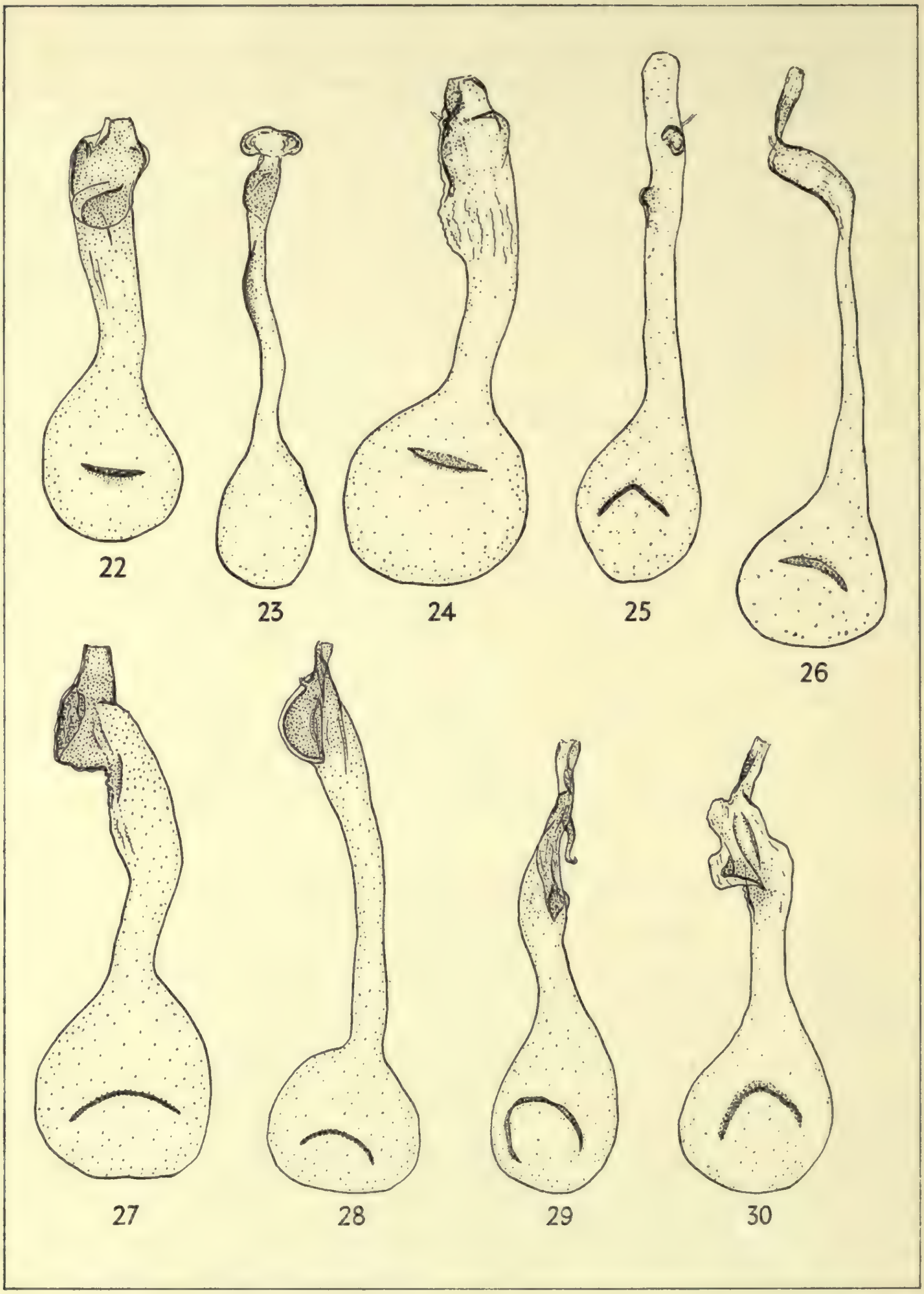
♂, ♀ 22–27 mm. Markings closely similar to *zanclophora*, especially to Madagascan examples of that species. Tornal patch of hindwings with a *well-defined* projection towards antemedial line.

♂ genitalia : Valva similar to *zanclophora*, rather more pointed at apex ; aedoeagus with an apical bunch of small, slender, pointed cornuti ; coremata similar, but with additional simple, blade-like fuscous scales.

♀ genitalia : Very similar to *zanclophora*, but protuberance of ductus bursae smoothly rounded.

Distribution : Apparently confined to Madagascar.

Material examined. British Museum (Natural History) : *Holotype ♂, allotype ♀*, Diego Suarez, Madagascar, 5 Feb. 1917, G. Melou ; 10♂, 10♀ *paratypes* from type locality ; 29♂, 33♀, from type locality ; 1♂, 5♀, Nanisana, near Tananarivo,



FIGS. 22–30. *Pardomima* (*Pardomima*) : Female genitalia. Ductus bursae and bursa copulatrix. 22. *P. testudinalis* Saalmüller. 23. *P. furcirenalis* Hampson. 24. *P. callixantha* sp. n. 25. *P. phalarota* Meyrick. 26. *P. phalaromima* Meyrick. 27. *P. zanclophora* sp. n. 28. *P. azancla* sp. n. 29. *P. telanepsia* sp. n. 30. *P. phaeoparda* sp. n. All figures × 15.

Feb. 1932, Mme. N. d'Olsoufieff. MUSÉUM NATIONAL D'HISTOIRE NATURELLE, PARIS : 1♀ *paratype*, Madagascar, Centr. Plateaux de l'Imerina, Parc de Tsimbazaza, 1200 m., 11.xii.1951, P. Viette.

Pardomima (Pardomima) phaeoparda sp. n.

(Text-fig. 17, 18, 21, 30 ; Plate 23, fig. 15)

Superficially resembles dark forms of *phalaromima*, from which it may be distinguished by the shorter third segment of the labial palpi. It may be separated from the other African species by the presence of fuscous scales on the proboscis.

♂, ♀ 23–24 mm. Secondary markings well-developed, ground colour pale whitish-yellow. Proboscis with fuscous scales. Thorax and abdomen mainly fuscous above, ground colour reduced to small spots. Basal line of forewing very broad, scarcely separated from antemedial line ; discal dot large, connected to discal blotch along cubitus and on costa, enclosing a subtriangular patch of ground colour, a similar patch below cubitus ; remainder of area between antemedial and post-medial lines fuscous ; except for narrow streaks of ground colour immediately distad of first and fourth segments of postmedial line, and a faint spot above tornus, remainder of wing fuscous. Antemedial line of hindwing broad ; terminal third of wing fuscous, except for two streaks of ground colour ; tornal patch large, projecting towards antemedial line.

♂ genitalia : Costa of valva strongly arched at base, apex rounded ; aedoeagus with a medial bunch of slender, pointed cornuti ; coremata with both simple and compound scales.

♀ genitalia : Ductus bursae sclerotized adjacent to ostium bursae, where it is expanded into a crumpled protuberance of irregular outline ; signum crescent-shaped, denticulate.

DISTRIBUTION. Sierra Leone, Ivory Coast, Nigeria, Belgian Congo.

MATERIAL EXAMINED : BRITISH MUSEUM (NATURAL HISTORY) : *Holotype* ♂, Sierra Leone, July 1904, Major Bainbridge ; *allotype* ♀, Bingerville, Ivory Coast, 1915, G. Melou ; 2♂ *paratypes*, Ogruga, Niger ; Kassai district, Congo F.St., Taymans.

Subgenus ***PACHYPARDA*** n.

Differs from the typical subgenus as follows : ♂ mid-femur enlarged, containing a cavity filled with ochreous-yellow hairs, an elliptical aperture on the inner surface (Text-fig. 43) ; valva of male large, costa irregular, with protuberances ; coremata with both simple and compound scales ; bursa copulatrix of female without signum. Typical markings of abdomen not well developed, pale lateral streak on eighth segment of male not well defined.

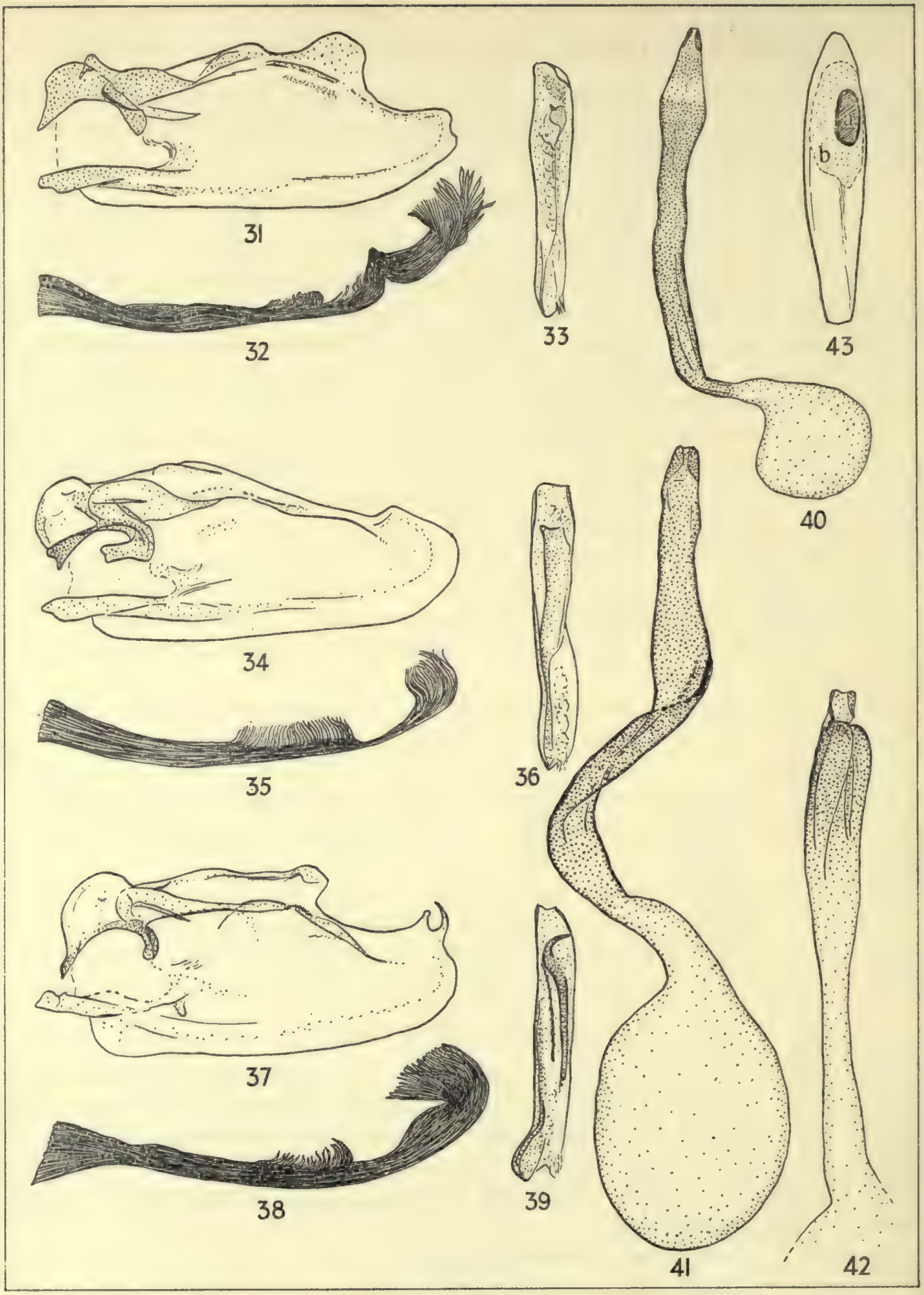
Type species : *Pardomima distortana* Strand.

DISTRIBUTION : West Africa and Belgian Congo.

Pardomima (Pachyparda) tumidipes (Hampson)

(Text-figs. 31–33, 40 ; Plate 23, fig. 16)

Sylepta tumidipes Hampson, 1912. *Ann. Mag. nat. Hist.* (8) **10** : 6 (partim).
Sylepta tumidipes Hampson, Klima, 1939. *Lepidopterorum Catalogus* **89** : 211 (partim).



FIGS. 31–43. *Pardomima* (*Pachyparda*) : Male and female genitalia. 31. *P. tumidipes* Hampson, valva. 32. *P. tumidipes* Hampson, coremata scale. 33. *P. tumidipes* Hampson, aedoeagus. 34. *P. margarodes* sp. n., valva. 35. *P. margarodes* sp. n., coremata scale. 36. *P. margarodes* sp. n., aedoeagus. 37. *P. distortana* Strand, valva. 38. *P. distortana* Strand, coremata scale. 39. *P. distortana* Strand, aedoeagus. 40. *P. tumidipes* Hampson, ductus bursae and bursa copulatrix. 41. *P. margarodes* sp. n., ductus bursae and bursa copulatrix. 42. *P. distortana* Strand, ductus bursae and bursa copulatrix. 43. *P. distortana* Strand, inner surface of mid femur of male, showing the aperture (*a*) and the extent of the cavity containing hairs (*b*). Figures 31–42, × 15 ; figure 43, × 7½.

Dichocrocis phalarota Meyrick, Ghesquière, 1942. *Ann. Mus. Congo belge* C. (3[2]) **7** (2) : 140–141 (partim).

Distinguished from *margarodes* and *distortana* by the shape of the area of ground colour between the two terminal patches of the hindwings.

♂, ♀ 20–22 mm. Head, thorax and abdomen ochreous-white, tinged with ochreous orange, second abdominal tergum with three fuscous dots, seventh with two fuscous dots ; genital capsule of male mainly ochreous-white. Forewing very similar to that of *telanepsia*, but discal dot not connected to discal blotch along cubitus. Hindwing similar to that of *telanepsia*, but apical patch not connected to postmedial line ; tornal patch more diffuse ; area of ground colour between terminal patches parallel-sided.

♂ genitalia : Costal margin of valva with large rounded protuberance at two-thirds, apex of valva concave ; aedoeagus with a single, weakly-sclerotized, sub-circular cornutus with a short apical pointed projection, and a slender tapering continuation towards base ; coremata with both simple and compound, light and dark scales.

♀ genitalia : Ductus bursae sclerotized throughout length ; bursa copulatrix rather small.

DISTRIBUTION. Sierra Leone, Gabon, Belgian Congo.

MATERIAL EXAMINED. BRITISH MUSEUM (NATURAL HISTORY) : 1♂ *syntype*, Sierra Leone, 28.4.1895, Clements ; 1♂, Sierra Leone, Hill Station, M. Frere ; 1♂, Abanga R., Gabon, Oct. 1897, Dr. Ansorge. MUSÉE DU CONGO BELGE, TERVUREN : 1♀. Manghay, 27.x.1921, L. Verlaine.

TYPE MATERIAL. BRITISH MUSEUM (NATURAL HISTORY) : The two ♂ *syntypes* described by Hampson belong to two species. One is referable to *distortana* Strand ; the other, listed above, is here designated lectotype.

Pardomima (Pachyparda) margarodes sp. n.

(Text-figs. 34–36, 41 ; Plate 23, figs. 17, 19)

Very closely allied to *distortana* ; distinguished from it by the lighter colour and lesser extent of the fuscous markings ; the areas of ground colour distad of third and fourth segments of postmedial line of hindwings of about equal extent.

♂, ♀ 22–27 mm. Head, thorax and abdomen ochreous yellow ; second and seventh and in male eighth, abdominal terga often with fuscous scales. Wings with a pearly sheen, not violaceous as in *distortana*. Markings similar to those of *tumidipes*, lines and patches often with crenulate margins. Area between tornal and apical patches of hindwing not parallel-sided, outer margin curving inwards to meet inner towards costa.

♂ genitalia : Costal margin of valva with a protuberance at one-third, stepped outwards at four-fifths ; aedoeagus with a single, broad, weakly sclerotized cornutus bearing a short, latero-distal projection.

♀ genitalia : Ductus bursae sclerotized throughout length, twisted, compressed, a series of heavily sclerotized, opaque, prominences along margin so formed ; bursa copulatrix large.

Distribution. Southern Nigeria.

Material examined. British Museum (Natural History) : *Holotype* ♂, *allotype* ♀, Warri, v, vi, 1897, Dr. Roth ; 10♂, 10♀, *paratypes* from type locality ; 2♂, 7♀ from type locality ; 1♂, Akassa-Onitsha, R. Niger, Dr. Cook.

Pardomima (Pachyparda) distortana (Strand)

(Text-figs. 37–39, 42, 43 ; Plate 23, figs. 18)

Sylepta tumidipes Hampson, 1912. *Ann. Mag. nat. Hist.* (8) **10** : 6 (partim).
Lygropia distortana Strand, 1913. *Arch. Naturgesch.* **78** (A12) : 75.
Sylepta tumidipes ab. *hampsoniana* n., Strand, 1917. *Arch. Naturgesch.* **82** : (A3) : 10.
Conogethes empalacta Meyrick, 1937. *Exotic Microlepidoptera* **5** : 104.
Pycnarmon empalacta Meyrick, Klima, 1939. *Lepidopterorum Catalogus* **89** : 25.
Sylepta tumidipes Hampson, Klima, 1939. *Lepidopterorum Catalogus* **89** : 211 (partim).
Lygropia distortana Strand, Klima, 1939. *Lepidopterorum Catalogus* **94** : 229.
Syllepta tumidipes Hampson, Ghesquière, 1942. *Ann. Mus. Congo belge* C. (3[2]) **7** (2) : 152.

Very closely allied to *margarodes*. The reduction or absence of the area of ground colour above tornus of the forewings is characteristic ; the name ab. *hampsoniana* could be used for those specimens in which this area is absent.

♂, ♀ 23–27 mm. Abdominal terga of male mainly fuscous, of female mainly ochreous-orange. Very similar to *margarodes*, but markings darker and more intense, wings with a violaceous pearly lustre. Terminal areas of both wings more heavily marked than in *margarodes*, area of ground colour distad of third segment of postmedial line of forewing smaller than corresponding area adjacent to fourth segment, or absent ; corresponding areas of the hindwing similarly reduced.

♂ genitalia : Costal margin of valva with a rounded protuberance at two-thirds, two slender projections near apex, the inner blunt, the outer pointed, almost enclosing a sub-circular area ; aedoeagus with a row of slender, pointed cornuti and a large, curved thorn-like cornutus ; coremata with both simple and compound, light and dark scales.

♀ genitalia : Ductus bursae sclerotized near ostium bursae only ; bursa copulatrix large.

Distribution. Sierra Leone, Ivory Coast, Gold Coast, Nigeria, Cameroons, Rio Muni, Gabon, Belgian Congo.

Material examined. British Museum (Natural History) : 1 ♂ (syntype of *P. tumidipes* Hampson), Sierra Leone, 12.xi.1895, Clements ; 1♂, 1♀, Sierra Leone, Dr. Cator ; 1♂, Sierra Leone, A. B. Frere ; 22♂, 40♀, Bingerville, Ivory Coast, June 13–15, July 1–11, 28–31, Aug. 11–25, Sept. 1–15, 1915, G. Melou ; 2♂, Assinie ; 1♂, Aburi, Gold Coast, 1912–1913, W. H. Patterson ; 2♂ (ab. 1. of *tumidipes* Hampson, subsequently named by Strand ab. *hampsoniana*), Coomassie, Whiteside, and R. Niger, Sapele, F. W. Sampson ; 3♂, Warri, v, vi, vii, 1897, Dr. Roth ; 1♂, S. Nigeria, Ilesha, L. E. H. Humfrey ; 5♂, 2♀, Bitje, Ja River, Cameroons, 2,000 ft., Bates ; 1♂, Afr. Occid, Johann-Albrechts Höhe, Station Kamerun, 1898, L. Conradt ; 2♂, Lake Ansebbe, Fernan-Vaz, Gabon, Feb. 1908, Dr. Ansorge ; 2♂, Abanga R., Gabon, Oct. 1907, Dr. Ansorge. Musée du Congo Belge, Tervuren : 1♂ (*type* of *P. empalacta*

Meyrick, Lulua:Kapanga, xii.1933, F. G. Overlaet ; 1♂, Kafakumba, xii.1932, F. G. Overlaet ; 1♀, Bitye, Bates-Rosenberg. ZOOLOGISCHES MUSEUM, BERLIN : *Holotype* ♀, Span, Guinea, Benitogbt., Alén, 1–15.ix.1906, G. Tessmann ; 2♂, Ogowe, Lambar., Moq.

SUMMARY

Twelve species of the genus *Pardomima* are here described, included in two subgenera ; six of the species and one subgenus are described as new. Many of these species have been confused hitherto under the name "*Lygropia amyntusalis* Walker". None of the previously described species has hitherto been included in the genus *Pardomima* ; they are listed below with the generic names under which they are placed in the *Lepidopterorum Catalogus* :

Pycnarmon : *phalaromima* Meyrick ; *empalacta* Meyrick (= *distortana* Strand), new synonymy.

Lamprosema : *furcirenalis* Hampson.

Lygropia : *testudinalis* Saalmüller (*ex* synonymy) ; *phalarota* Meyrick ; *distortana* Strand.

Sylepta : *tumidipes* Hampson.

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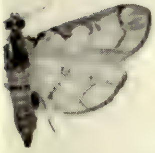
EXPLANATION OF PLATE

The African species of the genus *Pardomima* Warren.

FIG. 1. *P. furcirenalis* Hampson, ♀.
FIG. 2. *P. testudinalis* Saalmüller, ♀.
FIG. 3. *P. callixantha* sp. n., ♀.
FIG. 4. *P. telanepsia* sp. n., ♂.
FIG. 5. *P. telanepsia* sp. n., ♂.
FIG. 6. *P. phalarota* Meyrick, type ♂.
FIG. 7. *P. phalarota* Meyrick, ♀.
FIG. 8. *P. phalaromima* Meyrick, ♂.
FIG. 9. *P. phalaromima* Meyrick, ♂.
FIG. 10. *P. phalaromima* Meyrick, ♀.
FIG. 11. *P. zanclophora* sp. n., holotype ♂.
FIG. 12. *P. zanclophora* sp. n., ♀.
FIG. 13. *P. zanclophora* sp. n., ♀.
FIG. 14. *P. azancla* sp. n., ♂.
FIG. 15. *P. phaeoparda* sp. n., holotype ♂.
FIG. 16. *P. tumidipes* Hampson, lectotype ♂.
FIG. 17. *P. margarodes* sp. n., ♀.
FIG. 18. *P. distortana* Strand, type ♀.
FIG. 19. *P. margarodes* sp. n., ♂; lateral view of head.
FIG. 20. *P. phalaromima* Meyrick, ♂; lateral view of head.

Figures 1–18, × 2; figures 19, 20, × 15. Figures 2, 4, 5 and 10 represent the left side of the specimen.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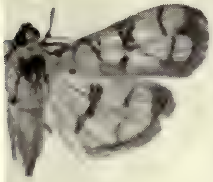
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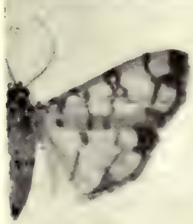
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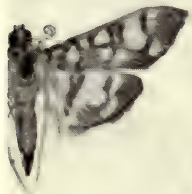
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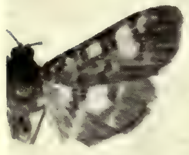
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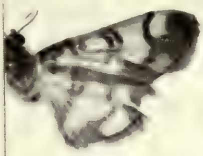
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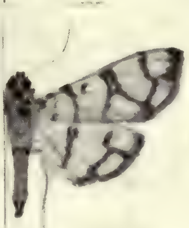
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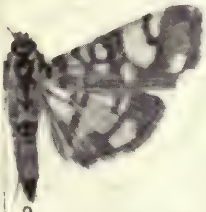
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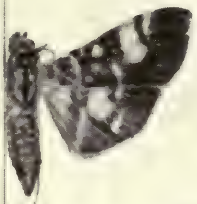
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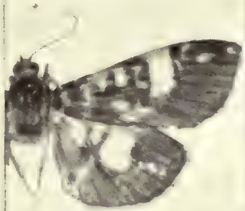
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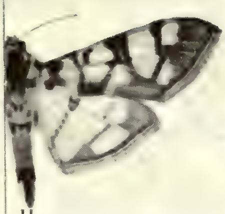
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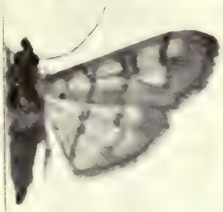
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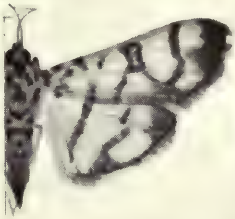
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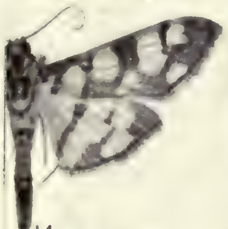
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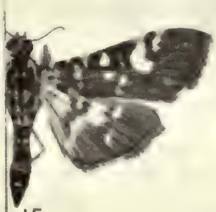
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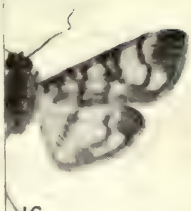
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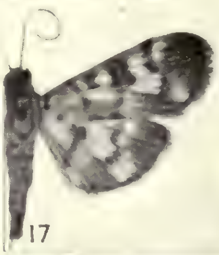
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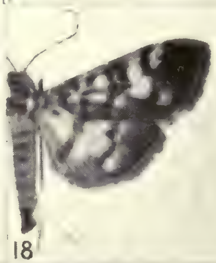
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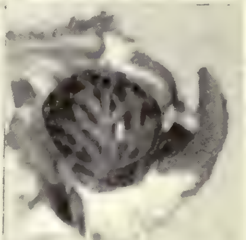
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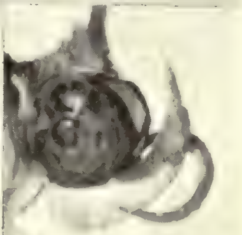
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